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A Holistic Approach to Infant Sleep

MacKenzie Danielson

Karlie Marler

Alyssa Turner-Strong

A Holistic Approach to Infant Sleep

By

Mackenzie Danielson, Karlie Marler, and Alyssa Turner-Strong

Advisor: Dr. Grabanski

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This scholarly project, submitted by, Mackenzie Danielson, MOTS, Karlie Marler, MOTS, and Alyssa Turner-Strong, MOTS, in partial fulfillment of the requirement for the Degree of Master of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

Julie Jakubowski, PhD

Faculty Advisor

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Date

PERMISSION

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Signature Alyssa Turner-Strong Date 12/5/19

Signature Mackenzie Dambom Date 12/5/19

Signature Karlie J Marler Date 12/5/19

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ABSTRACT

A Holistic Approach to Infant Sleep. Mackenzie Danielson, Karlie Marler, Alyssa Turner-Strong, Dr. Julie Grabanski, Department of Occupational Therapy, University of North Dakota School of Medicine and Health Sciences, 1301 N. Columbia Road, Grand Forks, ND 58202

Purpose: The purpose of this scholarly project was to analyze and review current literature to determine the key variables that impact infant sleep. Based on the literature, the authors then created an educational manual and sleep assessment for occupational therapists that holistically addresses infant sleep.

Methodology: An extensive review of literature was completed on the role of occupational therapy, assessment tools, interventions, modifications of the environment, sensory aspects, positioning, safety recommendations, the effect of nutrition, behavioral training, and cultural differences.

Summary: A holistic screening tool and occupational therapist educational guide were created based on the Person-Environment-Occupation Model of Occupational Performance. The Infant Sleep Questionnaire addresses all areas that could potentially affect infant sleep and assess the need for occupational therapy services. *An Occupational Therapy Holistic Guide to Infant Sleep* was created for occupational therapists working with infants and their caregivers to address developing a holistic treatment plan for infants and their caregivers.

CHAPTER I

INTRODUCTION

Problems with sleep in infants are common in families, with at least 30% of all parents with healthy infants complaining of concern for their infant's sleep (Hiscock & Davey, 2012). Lack of sleep can lead to many different problems for infants or small children, as sleep plays a large role in brain development (Hiscock & Davey, 2012; Tarullo, Balsam, & Fifer, 2010). Inadequate sleep can be detrimental to cognitive, psychomotor, physical and socioemotional development, including emotional regulation, mood, and behavior in infancy and childhood (Paul et al., 2016). Sleep problems are also associated secondary effects on families, such as disrupted parent sleep, marital discord, and maternal depression (Byars et al., 2012).

Parental knowledge of sleep concepts is low, leading to decreased parental responses, decreased infant sleep hygiene, and increased use of unsafe sleep positions and locations (Hiscock & Davey, 2012; Martins et al., 2018; Tsai, Lee, Chen, & Tung, 2018). These, along with other factors, contribute to the need for consultation with an occupational therapist for infant sleep. However, there is not much information on infant sleep or assessments in occupational therapy textbooks and common resources, as evidenced by the small sections and limited assessments found within core occupational therapy textbooks. For these reasons, an occupational therapist manual is needed to further inform occupational therapists to guide consultation and therapy services, so that

therapists may provide comprehensive and holistic care for families and their infants in need.

Occupational therapists (OT) may play an important role in infant sleep, as OT's use knowledge of sleep physiology, disorders, and evidence-based sleep promotion strategies to assess and address the consequences of sleep insufficiency on occupational performance and participation (Picard, 2017).

For this project, the authors chose to focus on infants ages 0 to 2 years of age. The authors chose this population as there is a gap in the literature for infant sleep within this age group. The majority of the literature on sleep practices focuses on older children or adults, showing the need for this project. Infanthood is defined as a child during the earliest period of its life, a beginner in life or inexperienced in an activity (Infant-hood, 2019).

The development of this project is guided by the Person-Environment-Occupation model (PEO) and is also incorporated into the assessment tool and an education guide for occupational therapists to utilize during therapy sessions. This model views the person as an individual consisting of different interests, values, and sensory and motor abilities (Law et al., 1996). The environment within the PEO model examines the five aspects of the person's context which includes cultural, socioeconomic, institutional, physical, and social environment (Law et al., 1996). Occupation is a broad term in this model and refers to not only occupation but also task and activity (Law et al., 1996). The PEO model focuses on making changes to an individual's occupational performance using the three major components together (Law et al., 1996). The authors will look at the

transactions of the PEO model including the person, environment, and occupation to guide their process of the assessment and educational guide.

Some key terms and concepts used throughout this project are:

Sleep deprivation: is the situation or condition of suffering from a lack of sleep (U.S. Department of Health & Human Services, n.d.).

Sleep Routine: a consistent approach to sleep, including sleep and wake times and habitual behavior prior to bedtime (National Sleep Foundation, 2019).

Sudden Infant Death Syndrome (SIDS): is the unexplained death, usually during sleep, of a seemingly healthy baby less than a year old. SIDS is sometimes known as crib death because the infants often die in their cribs (Mayo Clinic, 2018).

Supine: lying on the back or faced upward (Salls, Silverman, & Gatty, 2002).

Sleep state: stage of sleeping or arousal (Sleep, 2019).

The following chapters of this scholarly project are organized for the reader, supplementing the role of OT and practice guide. Chapter II includes a review of the literature on many factors that influence an infant's sleep. It also includes the problem of the lack of knowledge of caregivers with infant sleep and assessments that can be utilized. Chapter III includes the methodology which is an overview of the product and the relationship of the literature and knowledge base. It is also a detailed description of the process for gathering information and developing the product. Chapter IV includes the product of the assessment tool and educational guide for therapists to use in practice. Chapter V includes the summary of the scholarly project, limitations, further research, implementations, recommendations, and final conclusion.

CHAPTER II

REVIEW OF LITERATURE

The Importance of Sleep

By the time a child reaches three years of age, they will have spent more time in their life asleep than awake (Hiscock & Davey, 2012). Infant sleep problems are prevalent, with at least 30% of all parents with healthy infants complaining about their infant's sleep at some stage (Hiscock & Davey, 2012). The biggest problems being reported are longer sleep onset latency, poorer sleep maintenance, and shorter sleep duration from 0 to 24 months (Byars et al., 2012). A lack of sleep in infants can lead to multiple different problems for infants (Hiscock & Davey, 2012; Tarullo, Balsam, & Fifer, 2010). Insufficient sleep can be detrimental to cognitive, psychomotor, physical and socioemotional development, including emotional regulation, mood, and behavior in infancy and childhood (Paul et al., 2016). According to Crawford (2016), newborns (0-3 months) should get 14 to 17 hours of sleep each night, infants (4-11 months) should get 12 to 15 hours of sleep each night, and toddlers (1-2 years) should get 11 to 14 hours of sleep each night. Insufficient sleep can be detrimental to cognitive, psychomotor, physical and socioemotional development, including emotional regulation, mood, and behavior in infancy and childhood (Paul et al., 2016). Sleep problems are also associated with impairments in daytime functioning and decreased quality of life in affected infants

as well as secondary effects on families, such as disrupted parent sleep, marital discord, and maternal depression (Byars et al., 2012).

Sleep also plays a large role in brain development. Active sleep facilitates neural processes, such as synapse formation and pruning (Tarullo, Balsam, & Fifer, 2010). Sleep in infancy appears to set the state for later learning and is an indicator of cognitive complexity (Tarullo, Balsam, & Fifer, 2010). Different types of memory, such as declarative, non-declarative, motor memory, and visual memory all are influenced by the amount and duration of REM sleep cycles, as any learning that takes place while awake is likely to benefit from memory facilitation produced by sleep (Tarullo, Balsam, & Fifer, 2010). Emerging evidence suggests that infants can also process sensory input and learn while in sleep states (Tarullo, Balsam, & Fifer, 2010).

As of now there are some options for parents who struggle with sleep with their infant. There are hospitals with sleep centers dedicated to helping parents or infants/ children, however, there are not always specialists in close distance or proximity to most families, especially for families who live in rural areas. With many parents reporting sleep problems, basic physiology and development of sleep patterns, normative sleep durations, and with many influencing factors being important to understanding and diagnosing infant sleep problems, pediatricians are reporting little formal training in sleep medicine (Bathory & Tomopoulos, 2017). As there have been gaps in the availability of clinical sleep services for infants and children, sleep coaching or consulting has emerged and appears to be increasing (Mindell et al., 2016). Sleep coaches or consultants are typically individuals who provide individualized services in person or via the

Internet/phone to families of infants or children with sleeping problems (Mindell et al., 2016).

The Role of Occupational Therapy

Adequate sleep provides the foundation for optimal occupational performance and engagement in daily life, which is consistent with occupational therapy, as the impact of sleep on function and participation is incorporated into the repertoire of occupational therapy practitioners and can be addressed across the life span (American Occupational Therapy Association, 2014; Picard, 2017). Occupational therapy is defined as the therapeutic use of everyday life activities (occupations) with individuals to enhance or enable participation in roles, habits, and routines at home, school, workplace, community, and other settings (American Occupational Therapy Association, 2014). Occupational therapists may address sleep in practice as they use knowledge of sleep physiology, sleep disorders, and evidence-based sleep promotion practices to evaluate and address the ramifications of sleep insufficiency or sleep disorders on occupational performance and participation (Picard, 2017). Occupational therapists use many different interventions to promote optimal sleep performance in different age groups, such as: education on sleep misconceptions, addressing secondary conditions such as pain, establishing routines and habits, teaching cognitive-behavioral techniques, increasing coping skills and time management, modifying the environment, and addressing sensory disorders and teaching caregiver management (Picard, 2017).

Occupational therapists can address sleep as it is part of the domain of practice, which may lead some therapists into sleep consulting (American Occupational Therapy Association, 2014; Mindell et al., 2017). Occupational therapists most commonly have

roles in helping children with Autism Spectrum Disorder or older adults in long term care in regard to sleep (Picard, 2017). However, with three out of every ten parents having difficulties with sleep with their infants at some stage, many parents may need more consultation with occupational therapists for increased caregiver training to promote more efficient sleep for their younger infants (Hiscock & Davey, 2012). The proposed role of occupational therapy is increased prevention and promotion of different sleep strategies and interventions to help caregivers and families who have infants with decreased sleep habits or routines.

Assessments

Occupational therapists may use assessments to identify if there is an issue with infant sleep or to identify the different factors that may be impacting sleep, such as sensory or environmental components. However, there are not many assessments or screening tools available for this population. A majority of the assessments that are available for assessing sleep are for individuals that are older in age. Some assessments that may be effective or helpful in assessing infant sleep are:

- The Infant Sleep Questionnaire: maternal self-report of sleeping behavior for 12-18-month-olds (Morrell, 2003).
- Brief Infant Sleep Questionnaire (BISQ): parent report questionnaire on infants (0-29 months), focusing on sleep duration, night waking's, method of falling asleep (Sadeh, 2004).
- Sensory Profile or Sensory Profile 2: a measure of a child's/infant's responses to sensory events in daily life (Dunn, 2014).

- BEARS Sleep Screening Tool: free instrument that is divided into five major sleep domains (bedtime problems, excessive daytime sleepiness, awakenings during the night, regularity and duration of sleep, and snoring), providing a comprehensive screen for the major sleep disorders affecting children in the 2-to-18-year-old range. Each sleep domain has a set of age-appropriate "trigger questions" for use in the clinical interview (Shahid, Wilkinson, Marcus, & Shapiro, 2011).

Environmental Modifications

The environment is an important factor to increase infant sleep. According to Crawford (2017), the room should be set between 16-20 degrees Celsius (61-68 degrees Fahrenheit) to promote proper sleep. The temperature is especially important as being overheated leads to an increase in Sudden Infant Death Syndrome, otherwise known as SIDS (American Academy of Pediatrics, 2011). The lights should be dimmed, and care should be taken to reduce avoidable noises, such as sound systems, televisions, computer games, and more, which can lead to increased awakenings (Crawford, 2017). A relaxing and settled period of time should be taken prior to bedtime and can be modified to promote optimal sleep time (Crawford, 2017). Overall, it has been found that infants sleep longer when there is a presence of environmental management, such as with temperature, sound, and lights (Orsi, Llaguno, Avelar, Tsunemi, Pedreira, Sato, & Pinheiro, 2015).

Sensory

Many of the sensory aspects of sleep may play a big factor on why sleep is difficult for many infants or young children. Using the Sensory Profile, researchers Tauman, Ayni, Drori-Asayag, Nehama, Greenfeld, and Leitner (2017), investigated the

sensory profile of infants and children with behavioral insomnia, which is a prevalent condition affecting 10-30% of children aged 6-36 months with the infants' having consistent difficulties in falling asleep, staying asleep, or both. The Sensory Profile shows an overall picture of a child's sensory processing patterns by examining eight main areas of sensory input, including auditory, visual, activity level, taste/ smell, body position, movement, touch and emotional/social (Dunn, 2014; Tauman et al., 2017). The Sensory Profile has four different quadrants that explain a child's sensory system (Dunn, 2014). Low registration means an individual has a high sensory threshold with passive responding strategies; they would tend to not notice things in the environment, which causes lack of movement, triggering the nervous system to shut down and stop processing information which makes them seem lethargic or uninterested in their surroundings (Dunn, 2014; Tauman et al., 2017). Sensation Seeking means they have a high sensory threshold with active responding strategies, which would show the infant/child being highly interested in movements, pressure, lights, colors, sounds, smells, and tastes which leads to excessive jumping, licking, crashing into items, etc. (Dunn, 2014; Tauman et al., 2017). Sensory Sensitivity is low sensory threshold with passive responding strategies; this means that a person is more aware and sensitive to the surrounding forms of input around them, being bothered by loud sounds, bright lights or colors, many people in a room, temperatures, and more (Dunn, 2014; Tauman et al., 2017). Sensation Avoiding means that the person has a low sensory threshold with active responding strategies, which means they have a heightened awareness and response to sensations, sounds, and environments with any stimuli potentially sending the person into a negative behavior response (Dunn, 2014; Tauman et al., 2017). The results from the Tauman et al. (2017)

study showed that children and infants who had behavioral insomnia had the highest scores with auditory and tactile processing, showing that infants and children with these sensory issues may be affected most while trying to engage in sleep. The behavioral insomnia group had high numbers in the Low Registration, Sensory Sensitivity, and Sensation Avoiding quadrants when compared to the control group (Tauman et al., 2017). These results from this study show the impact that sensory sensations may have on sleep and the need for sensory interventions or changes to be made in their bedtime environment.

Multisensory Interventions. Since there is a need for multisensory interventions, one that can be used is ATVV, which uses auditory, tactile, visual, and vestibular sensations when an infant is waking or prior to sleep (Griffith, Rankin, & White-Traut, 2017). It is an intervention that can be used to facilitate increased sleeping and/or eating habits by using an infant's sensory system (Griffith, Rankin, & White-Traut, 2017). This intervention begins with infant directed talk (auditory) with eye contact (visual), next lead with a head massage with 6-10 strokes (tactile), arm massage with 6 times each arm (tactile), leg massage with 6 times each leg (tactile), chest and belly massage (tactile), back massage with circular motions (tactile), and ended with rocking for 5 minutes (vestibular) (Griffith, Rankin, & White-Traut, 2017). The combination of using these different sensations may improve an infant's arousal from sleep in order to begin oral feeding (Griffith, Rankin, & White-Traut, 2017).

In another article by Leichman, Mindell, Williamson, Lee, and Walters (2017), the authors instruct caregivers with an in-person visit and written documentation to a three-step nightly routine for two weeks. The nightly routine included a bath (with a

minimum of 5 minutes using products provided for washing), massage (with a minimum of 3 minutes with suggested techniques, using the provided massage product), and quiet activities (i.e. cuddling, singing) with lights being out within 30 minutes of the end of the bath (Leichman et al., 2017). By implementing this three-step multi-sensory routine, infants had improvements in sleep onset latency, decreased night wakings and increase duration, longer stretches of sleep, bedtime ease, improved infant morning mood, and improved parental perceptions of how the infant slept (Leichman et al., 2017).

Decreasing Use of Technology. Decreasing visual stimuli is becoming important prior to sleep as technology becomes more popular. Limiting screen time before bed has become more of an issue for infants and children than ever before (Bathory & Tomopoulos, 2017). A study was done by Bathory and Tomopoulos (2017), that looked at electronic device use before bed. The results showed with an increased use of computers, video games, television sets, and particular hand-held personal electronic devices, there is increasing evidence and concern that media use is interfering with sleep both neurophysiologically and by replacing sleep time (Bathory & Tomopoulos, 2017). Young children have been exposed to significantly more media over the past few decades (Bathory & Tomopoulos, 2017). Studies from the review show that 66% of children under the age of 2 years watch television, videos, or DVDs, averaging 56 minutes daily (Bathory and Tomopoulos, 2017). The popularity of mobile devices such as tablets and smartphones in recent years has compounded this problem, showing the need for decreased technology before bed to limit visual stimuli (Bathory & Tomopoulos, 2017).

Infant Sleep Machines. Noise often leads to sleep disturbance and arousal in infants, and this acoustic disturbance can have direct physiologic effects on infants and

can influence negatively both the quality and quantity of their sleep (Hugh, Wolter, Propst, Gordon, Cushing, & Papsin, 2014). Infant sleep machines (ISMs) make ambient noise or different noises to cover up other sounds in an infant's room with the goal of increasing uninterrupted sleep by soothing the infant or preventing arousal (Hugh et al., 2014). In the study by Hugh et al. (2014), the researchers tested different sound machines that made noises such as white noise, nature sounds (including rain, thunder, wind, ocean, river, campfire, insect, and bird sounds), mechanical sounds (including traffic, train, airplane, and machinery sounds, and heartbeats. After testing these different machines and noises with a simulated infant ear canal, the researchers determined that while they may be effective in promoting sleep, sleep machines are capable of producing output sound pressure levels that may be damaging to infant hearing and auditory development (Hugh et al., 2014). Constant exposure to these types of devices may put infants at risk of developing noise-induced hearing loss or maldevelopment of the auditory system leading to auditory sensory issues/defensiveness (Hugh et al., 2014). It is recommended that if used, noise machines should be placed as far away as possible from the infant and never in or near the crib (Hugh et al., 2014). Caregivers should also play the ISM at a low volume and only for a short duration and not constantly through the night (Hugh et al., 2014).

Safety

Along with promoting increased sleep, it is also the role of an occupational therapist to address sleep safety. This needs to be addressed, as decreased safety in sleep location, orientation, and co-sleeping may cause death by SIDS (American Academy of Pediatrics, 2011).

Sleep Location and Orientation. Researchers, Gaw, Chounthirath, Midgett, Guinlan, and Smith (2017) studied 1,736 reported incidents of accidental suffocation and strangulation in bed of infants younger than one year of age, gathering findings on the safety of the sleep environment for infants. The results showed that pillows were the most common object associated with death, followed by mattresses, blankets, and then the walls of the crib (Gaw et al, 2017). Among pillow-related deaths, 46% of infants were found positioned on top of a pillow and in a face-down/ prone orientation (Gaw et al, 2017). For the infants with blanket-associated deaths, infants were found on top, entangled, or covered by the blanket (Gaw et al, 2017). With mattress-related deaths, infants were founded wedged in at the edges (Gaw et al, 2017). Of wedged deaths, a large majority were found on a sofa or bed (Gaw et al, 2017). Only 17% of infants were found wedged in a crib or bassinet (Gaw et al, 2017). Overall, pillows and blankets were the most common non-sleep surface objects with confusion and misinformation among parents and caregivers contributing to the use of soft bedding items/loose bedding (Gaw et al, 2017). Healthcare providers also contribute to discrepancies in safe sleep messaging, since many pediatricians believed that a sleep orientation other than supine was best for infants (when in reality, other positions can lead to infant death) (Gaw et al, 2017). Wedging between or within objects was one of the most common positions that lead to infant death, showing the need for parents to be cautious of this when napping or sleeping with an infant in a place other than their own crib (American Academy of Pediatrics, 2011; Gaw et al, 2017). Although bumper pads have been marketed to reduce injuries in infants, they were also associated with infant morbidity (Gaw et al., 2017).

Because of these consistent statistics, it is recommended to use a firm sleep surface—A firm crib mattress, covered by a fitted sheet, is the recommended sleeping surface to reduce the risk of SIDS and suffocation (American Academy of Pediatrics, 2011). A crib, bassinet, or portable crib that conforms to the safety standards of the Consumer Product Safety Commission and ASTM International (formerly the American Society for Testing and Materials) is recommended (American Academy of Pediatrics, 2011). In addition, parents and providers should also check to make sure that the product/crib has not been recalled, as cribs with missing hardware should not be used, and the parent or provider should not attempt to fix broken components of a crib, because many deaths are associated with cribs that are broken or have missing parts (including those that have presumably been fixed) (American Academy of Pediatrics, 2011). Only mattresses designed for the specific product should be used; Mattresses should be firm and maintain their shape even when the fitted sheet designated for that model is used, such that there are no gaps between the mattress and the side of the crib, bassinet, or portable crib (American Academy of Pediatrics, 2011). Soft materials or objects such as pillows, quilts, comforters, or sheepskins, even if covered by a sheet, should not be placed under a sleeping infant (American Academy of Pediatrics, 2011). Lastly, it is recommended to not use soft objects, bumper pads, and loose bedding in the crib to reduce the risk of SIDS, suffocation, entrapment, and strangulation (American Academy of Pediatrics, 2011).

Co-sleeping. Results from an article by Teti, Shimizu, Crosby, & Kim (2016) have shown that compared with families whose infants were solitary sleepers by 6 months, persistent co-sleeping was associated with sleep disruption in mothers, but not in

infants. However, mothers in persistent co-sleeping arrangements reported that their infants had more frequent night awakenings (Teti, Shimizu, Crosby, & Kim, 2016). These results are consistent with past studies done on the topic of co-sleeping (Teti, Shimizu, Crosby, & Kim, 2016). Co-sleeping was also associated with maternal reports of marital and co-parenting distress, and lower maternal emotional availability with infants at bedtime as observed from home observations from researchers (Teti, Shimizu, Crosby, & Kim, 2016). Co-sleeping appeared to be a marker of elevated family stress, although the study design did not use strong enough tests to show causal support, and results may be particular to cultures that are not as supportive of co-sleeping practices when compared to other cultures (Teti, Shimizu, Crosby, & Kim, 2016). Lastly, there is also a potential danger and higher rate of (SIDS), as the infant may be smothered, cornered, or end up in the prone position (Teti, Shimizu, Crosby, & Kim, 2016). Higher rates of co-sleeping were seen in families with lower income and maternal education and for infants who were breastfed (Netsi, Santos, Stein, Barros, F. C., Barros, A. J. D., & Matijasevich, 2017).

Although co-sleeping can lead to marital and parental stress and led to increased infant night awakening in the United States, these statistics appear to be true even in other cultures, such as in China, who is more supportive of co-sleeping practices (Wang et al., 2013). However, many cultures choose to engage in co-sleeping practices for the many proposed positives. One positive is that it makes breastfeeding easier, since the infant is more accessible (American Academy of Pediatrics, 2011). Plus, there is less separation anxiety for the infant as the infant does not have to separate from either parent each night (American Academy of Pediatrics, 2011). Room sharing without bed sharing (also a form

of co-sleeping) can also reduce SIDS by as much as 50% (American Academy of Pediatrics, 2011).

Sleep and play positioning that is used during the day both affect infant gross skills and an infant's occupational development. Sleep positioning is of utmost importance, as it can also be a safety hazard if an infant is sleeping in an unrecommended sleep position. A study by Salls, Silverman, and Gatty (2002) studied the effects and importance of sleep and play positioning for infants. This study found that 59 out of the 66 caregivers reported to follow AAP guidelines and had their infant sleep in supine. The AAP is the American Academy of Pediatrics, an organization that dedicates their efforts and resources to the health, safety and well-being of infants, children, adolescents and young adults (American Academy of Pediatrics, 2019). The Salls, Silverman, and Gatty (2002) study showed significant differences in milestone achievement between the different groups of infants when comparing how much time they were in prone and their sleep position. This finding may be due to less developed neck extensor and shoulder musculature and is consistent with infant motor development literature (Salls, Silverman, & Gatty, 2002). Results of the study indicate overall that infants spent very little awake-time in prone positioning, which brings up the question of whether parents may be misinterpreting the intent of the "Back to Sleep" campaign from the AAP, and as a result, are avoiding prone (tummy time) for their babies during both sleep and awake-time, which affects their development (Salls, Silverman, & Gatty, 2002). Also, parents and healthcare professionals may benefit from education about the potential developmental benefits of prone positioning during awake-time and the safety risk of infants sleeping in prone position (Salls, Silverman, & Gatty, 2002). Parents who position their infants in

prone at night in the home environment likely do it due to observing hospital staff position babies on their side, which shows how safe sleep needs to be shown from the beginning (Krader, 2018; Crawford, 2017; Smith et al., 2010). This research is pertinent, as this provides further information into how an infant should sleep in supine but play in prone to gain the skills they need to hit milestones and achieve optimal development (Salls, Silverman, & Gatty, 2002).

Modesto, Avelar, Pedreira, Pradella, Avena, and Pinheiro (2016) did an observational study of infants in a neonatal unit related to sleep position and arousals. Arousal events were determined when an increase was observed in the frequency of waves and lines on electroencephalography (EEG) lasting longer than 15 seconds (Modesto, et al., 2016). The number of arousals were the highest in the supine position compared to infants positioned in the prone, left side, and right-side positioning (Modesto et al., 2016). In a similar study done by Kato, Scaillet, Groswasser...Franco (2006) it was found that sleeping in the prone position decreased the frequency of arousals of the cortical arousals in REM sleep. With fewer cortical arousals, this puts infants at a higher risk for SIDS (Kato et al., 2006). Overall, sleeping in prone may be detrimental to the safety of infants, as it can lead to SIDS (Kato et al., 2006; Salls, Silverman, & Gatty, 2002). It is the safest for an infant to be positioned in only supine within the first year of life as this position does not increase the risk of choking and aspiration in infants, even those with gastroesophageal reflux, because they have protective airway mechanisms (American Academy of Pediatrics, 2011).

Relationship between Sleep Behavioral States and Nutrition

The infant's ability to transition between behavioral states is determined by the infant's ability to self-regulate in response to internal/external stimuli which may also influence oral feeding efficiency (Giffith, Rankin, & White-Traut, 2017). It has been found in previous studies that during feeding, "unsuccessful feeders" spent more than 50% of their feeding in sleep states, whereas "successful feeders" were noticed to be in sleep states less than 33% of their feeding time (Giffith, Rankin, & White-Traut, 2017). In the research done by Giffith, Rankin, and White-Traut (2017), it was found that oral feeding efficiency increased with more time spent in alert states or crying, whereas oral feeding efficiency decreased when infants spent more time in sleep states prior to feeding. The results support earlier research which shows that alert states prior to feeding are significant predictors of oral feeding efficiency (Giffith, Rankin, & White-Traut, 2017). The findings also show that oral feeding efficiency was reduced when infants spent more time in sleep states prior to feeding; Therefore, oral feeding when infants are sleeping should be avoided if possible. The interventions to improve alert states include but are not limited to oral sensory stimulation, non-nutritive sucking, and multisensory interventions, such as ATVV (Giffith, Rankin, & White-Traut, 2017).

According to Bathory and Tomopoulos (2017), children should avoid stimulating activity and foods near sleep times, along with sugar and caffeine. Excessive night-time feeding can lead to frequent waking's and a learned hunger with the consumption of large volumes of fluid (Hiscock & Davey, 2018). Hunger sensations can become conditioned to trigger awakenings, interfering with return to sleep when most healthy full-term infants can go without a night feed by 6 months, which is recommended (Hiscock & Davey,

2018). Strategies to eliminate night-time feeding involves identifying the parental concern for continuing overnight feedings and reducing the frequency and volume of feedings over a period of time (Hiscock & Davey, 2012). Allowing the infant to develop other ways to settle to sleep at the beginning of the night, increasing the interval between breastfeeds/bottles and substituting water for milk/juices in the older infant are techniques that can be used (Hiscock & Davey, 2012).

Behavioral Training

Parental response to their infants at night during sleep may contribute to maladaptive coping behaviors by infants, resulting in a decrease of sleep and continued negative behaviors (Crichton & Symon, 2016). In a study by Crichton and Symon (2016), the results have shown that the success of behavioral strategies with parents is reliant upon information given, such as the quality and amount, with active preventative intervention improving sleep in the early months for infants (Crichton & Symon, 2016). For infants in the first few months of life without an established sleep problem, the use of education about infant sleep patterns, routines, and parental behavior to facilitate self-settling or self-soothing has been effective (Crichton & Symon, 2016). The more direct the advice to place the infant down awake and minimize responding, the greater the success with the intervention strategy (Crichton & Symon, 2016). The key information given to parents was to make sure the infant was placed in the cot/crib while awake to self-settle, to keep parental interaction within a block of sleep to a minimum, to include a "focal feed" to help increase feeding intervals at night, and to differentiate between day and night (Crichton & Symon, 2016). According to Hiscock and Davey (2018), there are many factors that go into how well an infant will sleep. Parents should be assisted with

techniques to enable them to be consistent which results in a change in the infant's behavior (Hiscock & Davey, 2018). These techniques should be implemented in the infant's early stage sand carried out through their development (Hiscock & Davey, 2018).

Behavioral Management Strategies. Extinction-based strategies have been a popular behavioral technique to use at night, where parents let the infants "cry it out" without responding immediately, with hopes of the infant self-soothing and returning to sleep (Crichton & Symon, 2016; Črnčec, Matthey, & Nemeth, 2010; Krader, 2018). Many people worry about the psychological effects of using this technique; however, there is no clear evidence that extinction-based techniques in infants under 6 months of age cause any harm physically or psychologically to the infant (Crichton & Symon, 2016; Črnčec, Matthey, & Nemeth, 2010; Krader, 2018). These strategies may be helpful for many families and may lead to later sleep successes (Crichton & Symon, 2016). Although they are proven to be successful in many situations, there are reasons parents may not want to engage in these behavioral practices, such as feeling uncomfortable with it or impacting a family's cultural practices, such as co-sleeping (Crichton & Symon, 2016).

One of the most important learned sleep behaviors in infancy is the ability to self-soothe and fall asleep independently (Bathory & Tomopoulos, 2017; Hiscock & Davey, 2012). To promote self-soothing, it is recommended that infants learn how to fall asleep independent of a caregiver, after a bedtime routine (Bathory & Tomopoulos, 2017). This ability to self-soothe allows infants to more rapidly return to sleep after the many physiologic arousals that occur throughout the night, and thus have more consolidated

and less fragmented nighttime sleep (Bathory & Tomopoulos, 2017). Healthy sleep patterns can be established, and sleep problems can be prevented and managed through sleep-promoting parenting practices, or good "sleep hygiene" (Bathory & Tomopoulos, 2017). Good quality sleep, particularly nighttime sleep, encourages full daytime alertness (Bathory & Tomopoulos, 2017).

It is important for an infant to learn to self-settle, rather than having to rely on an adult prior to nighttime (Bathory & Tomopoulos, 2017; Hiscock & Davey, 2012). Some behavior management strategies than promotes self-settling and self-soothing are: graduated extinction (also known as controlled crying or controlled comforting), adult fading (aka camping out), and parental presence (Hiscock & Davey, 2012). Graduated extinction is when a parent places an infant in the cot/crib and stays with them, patting or stroking them until quiet but not asleep (Hiscock & Davey, 2012). The parent then leaves the bedroom and if the infant cries, the parent returns to settle the infant in the cot at increasing time intervals, for example, 2, 4, 6, 8, 10 minutes (Hiscock & Davey, 2012). This approach takes approximately 3-7 nights to start working so should be tried consistently (Hiscock & Davey, 2012). For adult fading, the parent places a camp bed or chair next to the cot; For the first few nights, parents pat their infant to sleep and when the infant is settling with this, the parent spends the next few nights next to the cot but not touching their infant (Hiscock & Davey, 2012). The parent then moves their bed/chair out of the infant's room over 1-3 weeks and if the infant wakes overnight, the parent returns to the chair/bed and repeats the same process (Hiscock & Davey, 2012). For parental presence, it is a version of adult fading whereby the parent stays in the bed/chair for the whole night over a period of 7 nights with the parent minimizing touching/talking to the

infant (Hiscock & Davey, 2012). Each of these methods is found to be effective in research for infants above six months and should be explained to parents who then decide which strategy they want to pursue (Hiscock & Davey, 2012).

Bedtime Routines. Bedtime routines, sleep location, and parental/infant behavior are also big factors that impact infant sleep (Hiscock & Davey, 2012). In a randomized-controlled trial by Paul et al. (2016), researchers used a responsive parenting (RP) behavioral intervention to promote infant sleep. The RP group used a consistent 30-45-minute routine before bed with calming age-appropriate activities, feeding (not the last step before bed), and offering choices in the routine by choice between two books (Paul et al., 2016). The best bedtime was between 7-8 P.M., a stimulating environment with lights was avoided, white noise was used, along with swaddling and pacifier use. Infants were consistently put to bed drowsy but still awake by four months old, transitioned to own room by 3 months, avoided rocking and feeding to sleep, allowed infant time to self-soothe, had a nap routine during the day, and used strategies for separation anxiety affecting sleep (Paul et al., 2016). For interventions for night waking, parents were to respond differently night vs. day, stop waking infant routinely to feed, feed before parents' bedtime until 4 months, allow infant time to self-soothe at night, and to not reinforce waking (Paul et al., 2016). Also, lessons for parents included education on infant behavior states: drowsy, sleeping, fussy, and alert (Paul et al., 2016). They also included lessons that help parents recognize hunger and satiety cues, methods to soothe a fussy but not hungry infant, how to provide portions of healthy foods and improve acceptance of healthy foods, and how to engage infants in playtime to reduce sedentary behaviors that impact sleep negatively (Paul et al., 2016). These parental interventions,

environmental/sensory modifications, and behavioral strategies used lead to more RP infants showing the ability to self-soothe to sleep (Paul et al., 2016). These infants also had shorter bedtime routines and earlier bedtimes, were less likely to fall asleep being held, and were more likely to fall asleep within 15 minutes of being put to bed, leading to a longer sleep duration compared to infants in the control group (Paul et al., 2016). Overall, they had fewer night waking's, fewer nighttime feeds, and less time awake at night, showing that routine and sleep-related behaviors can improve an infant's ability to fall and stay asleep (Paul et al., 2016).

Routines are critical to good sleep hygiene, specifically regarding consistent sleep schedules and pre-sleep routines (Bathory & Tomopoulos, 2017; Hiscock & Davey, 2012). Routines benefit infants by providing them with a sense of predictability and security (Bathory & Tomopoulos, 2017). Consistent bedtime routines have been demonstrated to improve sleep (Mindell, Leichman, Lee, Williamson, & Walters, 2017). Nap and nighttime sleep schedules need to be timed appropriately so that nap times are not too late in the afternoon (Bathory & Tomopoulos, 2017). According to Leichman, Mindell, Williamson, Lee and Walters (2017), a simple, consistent bedtime routine, consisting of a bath, massage and quiet activities, resulted in rapid change for both child-level sleep variables as well as the mother's perception of her child's bedtime ease, sleep quality, and mood. The results from the study showed changes occurred within approximately three nights, and not only resulted in improvements in infant sleep, but also provided relief at a family level by improving the mother's experience of bedtime, which is often a stressful period (Leichman et al., 2017). Similarly, Mindell, Li, Sadeh, Kwon and Goh (2015), reported that a consistent nightly bedtime routine is associated

with better sleep in young infants, as manifested in earlier bedtimes, shorter sleep onset latency, decreased wakefulness after sleep onset, more total sleep, and decreased parent-perceived sleep problems, as well as report of decreased daytime behavior problems.

In a similar study done by Mindell, Lee, Leichman, and Rotella (2018), the researcher had caregivers complete a one-week baseline of a child's usual bedtime practices. The mothers were then instructed to institute a nightly two-step bedtime routine for a two-week period that included a massage and quiet activities (Mindell et al., 2018). Instructions were given for massaging the infant's chest, arms, hands, stomach, back, legs, and feet. Patients were instructed to have lights out within 30 minutes after completing the full-body massage (Mindell et al., 2018). In relation to sleep patterns, the only differences that were found were that the number of night waking's decreased in the intervention group (Mindell et al., 2018). Regarding maternal perceptions of the infant's sleep, Mindell et al. (2018), found that mothers perceived improvements in their infants sleep for all variables measured including: improvements in bedtime difficulty, how well their infant slept, infant morning mood, and the caregiver's confidence in managing the infants sleep issues. It was also found that the number of caregivers to report their infant as having a sleep problem significantly decreased in the two-week intervention period (Mindell et al., 2018).

Parental Interventions

In a study by Efendi, Caswini, Rustina, & Iskandar (2018), Mother Therapeutic Touch and Maternal Voice Stimulus have both been found to improve quality and duration of sleep in infants and even reduce their heart rate. Mother Therapeutic Touch (MTT) is defined as an effort to give comfort by using the hands of the infant's mother

(Efendi, Caswini, Rustina, & Iskandar, 2018). The steps of MTT: infant's mother warms up hands for two minutes, breathes slowly and rhythmically, slants the infant to the right or left side while flexing the infant's body positioning the mother's hands close to the mouth while flexing the infant's legs closer to the tummy (Efendi, Caswini, Rustina, & Iskandar, 2018). Next, the mother places one palm of one hand above the infant's neck and head (Efendi, Caswini, Rustina, & Iskandar, 2018). The other hand is rested on the infant's lower abdomen, encompassing the infant's waist and hip (Efendi, Caswini, Rustina, & Iskandar, 2018). This intervention usually lasts about 15 minutes and ended with careful removal of the mother's hands (Efendi, Caswini, Rustina, & Iskandar, 2018).

Maternal Voice Stimulus (MVS) is defined as music therapy which is sung by the infant's mother using traditional music, often referred to as lullabies (Efendi, Caswini, Rustina, & Iskandar, 2018). For this study there was a certain song selected called "Nina Bobo" as it has constant and stable rhythms, predictable tones, and repeated lyrics (Efendi, Caswini, Rustina, & Iskandar, 2018). The MVS intervention starts with the mothers recording themselves singing the Nina Bobo song for 15 minutes straight (Efendi, Caswini, Rustina, & Iskandar, 2018). With the sound volume set to less than 65 dB as to not be so loud on the recording device, the lullaby is then played near the infant's head and was turned off after 15 minutes (Efendi, Caswini, Rustina, & Iskandar, 2018). The results from this research study by Efendi et al., (2018) showed a significant increase in the sleep scores for the maternal voice stimulus group (MVS) and for the combined group. These infants were able to maintain their sleep after these therapies even after minimally invasive procedures (Efendi, Caswini, Rustina, & Iskandar, 2018).

MTT and MVS combined can maintain sleep and keep physiological functions stable in NICU's and in the home environment (Efendi, Caswini, Rustina, & Iskandar, 2018).

Parental Interventions for Anxiety/Fears. Nighttime fears and anxieties may be present in infants, as some may refuse to sleep by themselves overnight; Occasionally, bedtime problems are due to an anxiety disorder such as separation anxiety (Hiscock & Davey, 2012). Some parental interventions and supportive strategies that could benefit include: camper beds; transitional objects; muscle relaxation or visual imagery; positive self-statement; a 'worry box' to put worry thoughts in for the night; and sticker charts to reward brave behavior, for example, staying in the room (Hiscock & Davey, 2012).

Parental Education

A study done by Martins, Oliveira J. R. A., Salgado, Marques, Oliveira L. C. F, Oliveira G. R., and Ferreira (2018) determined that maternal information about sleep hygiene was positively associated with the adoption of healthy sleep habits in infants up to six months of age. The results proposed that if sleep education is intended to provide parents with strategies to encourage the adoption of healthy routines and sleep habits, they should be started as early as possible, ideally during pregnancy and in early postpartum (Hiscock & Davey, 2012; Martins et al., 2018). The infants of mothers who received information about sleep hygiene at the maternity ward presented more autonomous sleep habits, particularly with regard to the place where they place their infants during sleep, how they help the infant's fall asleep, and how to put infant's asleep after a night awakening (Martins et al., 2018). Tsai, Lee, Chen, & Tung (2018) determined that only 4% of parents used in their study knew basic sleep knowledge questions. There were 118 parents who reported an infant sleep problem, with 32 more

parents not knowing that their infant's sleep patterns were problematic (Tsai, Lee, Chen, & Tung, 2018).

According to McDowall, Elder, and Campbell, (2017), the research has shown that parent decisions about the consistency of child bedtimes may be determined in part by their knowledge of the importance of consistency of sleep routines. This is the core reason why occupational therapists as professionals should be educating parents on the importance of a good bedtime routine and how to maintain it during the infant's early years of life.

Cultural Differences

Although there are recommendations made to promote optimal sleeping conditions for infants, different cultures value different aspects of sleep, leading to different customs and outcomes. There is limited longitudinal data on infant's sleep from other countries with only a few reports from low and middle-income countries (Netsi et al., 2017). A study was done that compared infants in high-income countries (HICs) and infants in Brazil (Netsi et al., 2017). The results showed a substantial shift in rhythms with later bed and wake times by approximately 2 hours (Netsi et al., 2017). These remain stable throughout the first four years of life (Netsi et al., 2017). These populations also show high levels of co-sleeping which remain stable throughout. Later bedtime was associated with higher maternal education and family income (Netsi et al., 2017).

In a study done in South Carolina that looked at the trends and predictors of infant sleep positioning, the researchers found racial differences when studying the position in which the caregivers put their infants (Smith, Liu, Helms, & Wilkerson, 2012). The study was done around the time the "Back to Sleep" campaign was implemented to decrease

the rates of SIDS (Smith, Liu, Helms, & Wilkerson, 2012). According to Smith, Liu, Helms, & Wilkerson (2012), the rates of SIDS significantly differ by race and ethnicity, with blacks having a significantly higher risk of SIDS. At the time of the study, the prevalence of prone positioning among black infants had no net change and over half of the black infants were placed in discouraged positions (prone or lateral) (Smith, Liu, Helms, & Wilkerson, 2012). Certain maternal and infant characteristics were associated with the infant sleep positioning: maternal age (20-29 years of age), household poverty index (less than 185% of the federal poverty level), rural/urban status of residence county, and infant's age at the time of the survey (Smith, Liu, Helms, & Wilkerson, 2012).

Murray, Tran, Van Thang, McDonald, Beggs, and Fisher (2019) researched perspectives of Vietnamese health professionals on behavior of unsettled infants and how it is managed, along with availability of education to parents. Unsettled behaviors within this article are considered to be behaviors that include excessive crying episodes, being inconsolable and unreceptive to soothing, difficulties falling asleep, brief durations of sleep, and frequent waking periods during the night (Murray et al., 2019). In this specific area of Vietnam, there were no specific services for women with unsettled infants to receive advice or a solution to the problems they were going through (Murray et al., 2019). Families had to rely on other family members to help care for the unsettled infant (Murray et al., 2019). It is more likely for the families to seek assistance through Buddhist pagodas, as this is a center for Buddhism (Murray et al., 2019). This study also found that healthcare professionals are not completely informed on certain areas of unsettled infants (Murray et al., 2019).

OT Theory Used (PEO)

The theory used to guide this scholarly project is the Person-Environment-Occupation Model (PEO). This model is designed to look at all three domains, Person, Environment, and Occupation, and the connection between them (Law, Cooper, Strong, Stewart, Rigby, & Letts, 1996). In this model, a person is seen as unique and is made up of a physical, cognitive, sensory, affective, and spiritual component (Sue Baptiste, 2017). The environment is what surrounds a person, and is made up of the physical, social, cultural, institutional, and virtual contexts (Sue Baptiste, 2017). An occupation is defined as something that provides fulfillment and is purposeful, including things such as self-cares, productivity/work, leisure, or rest and sleep (Sue Baptiste, 2017). When there is a "fit" between the components of this model, occupational performance is maximized (Law et al., 1996). This model allowed our research to look at an infant's key domains and the transactions between them for balanced development. According to Hinojosa, Kramer, & Brasic Royeen, (2017), during childhood and infanthood, the three domains are mainly controlled by adults who are caring for the infant. When the situation is positive, the infant's central model component of occupational performance is the main domain and is equally balanced (Hinojosa et al., 2017).

Examples of the Person-Environment transaction would be the sensory aspects researched, as different tactile or auditory noise are in the environment and may be disturbing or bothersome to certain infants that have sensory dysfunction. One Occupation-Environment transaction would be the modification of the environment, as having the room between 61-68 degrees Fahrenheit and decreased noise leads to optimal sleeping, which is the occupation. A Person-Occupation transaction would be having the

infant follow a routine before bedtime. Overall, incorporating each domain and involving the transactions helped guide this project, as the bedroom or location of sleep (environment), the infant/caregiver (person), and the occupation of sleep were necessary aspects to research.

Introduction to An Occupational Therapy Holistic Guide for Infant Sleep

There are many different variables that may impact an infant's sleep or ability to fall and stay asleep. Researched topics include modification of the environment, impact of sensory stimuli, the relationship between nutrition and sleep, routine, positioning, parental interventions, parental education, behavior training, and cultural differences. Since many factors may affect an infant and their sleep routine, a holistic approach to sleep is needed to encourage and promote effective sleep in infants at any age. This can be done by forming an occupational therapy manual on infant sleep to inform and educate the caregiver on all the recommended and researched aspects of sleep that promote increased infant sleep. This manual will be organized by having each chapter focus on a different aspect of infant sleep (sensory aspects, routine, etc.). The use of this manual will promote healthy routines/habits and inform the reader on modifications of the environment, nutrition, sensory, sleep routine, positioning, parental interventions, behavior training, different cultural practices, and safety. This manual will in turn give occupational therapists the tools needed to install the confidence and knowledge caregiver's need in order to carry out different parental interventions, bedtime routines, safety recommendations, and modify their infant's environment, leading to increased parental efficacy and infant sleep. This manual will be guided by the PEO model and will

also incorporate assessments for an occupational therapist to use when consulting with families.

Summary of Findings

In summary, infant sleep is an important occupation to every age group, including infants, as it impacts their psychological, physical, and cognitive well-being (Byars et al, 2012; Hiscock & Davey, 2012; Tarullo, Balsam, & Fifer, 2010; Paul et al., 2016). Many caregivers report struggles with infant sleep, showing the need for consultation, intervention, and education on the topic (Byars et al., 2012; Mindell et al., 2016; Hiscock & Davey, 2012). Occupational therapists may play a prominent role in helping manage an infant's sleep, as therapists analyze the person, environment, and occupation of sleep, giving the profession the tools it needs in order to educate caregivers for the result of increased infant sleep (AOTA, 2014; Law et al., 1996; Mindell et al., 2017; Picard, 2017). There are limited assessments for occupational therapists to use to address sleep in infants (Dunn, 2014; Morrell, 2003; Sadeh, 2004; Shadid, Wilkinson, Marcus, & Shapiro, 2011).

When addressing sleep, environmental modifications are important, with the findings showing that environmental management in the form of a cool room and dimmed lighting leads to increased sleep (Crawford, 2017; Orsi et al., 2015). For many infants, sensory aspects may play a role, as they may be sensory sensitive or sensory avoiding, leading to an increased need for multisensory interventions or changes made to the bedtime environment, which is found to improve sleep latency (Dunn, 2014; Griffith, Rankin, & White-Traut, 2017; Tauman et al., 2017). Also, a decrease in technology use or screen time may be beneficial, as limiting visual stimuli is important prior to bedtime

(Bathory & Tomopoulos, 2017). Acoustically, infant sleep machines may benefit infants to promote sleep; however, research shows that they can be dangerous and harmful for infants if placed too close to their cribs or too loud (Hugh et al., 2014).

Another important aspect of sleep is safety, with it being recommended for the infant to only sleep in supine and to not use anything in the crib that is loose or that can smother an infant while sleeping (American Academy of Pediatrics, 2011; Gaw et al, 2017). Co-sleeping was also correlated with sleep disruption in mothers and frequent infant night awakenings and is not recommended by the AAP; however, there are perceived benefits, such as less infant separation anxiety, and it provides an easier time breastfeeding during the night (American Academy of Pediatrics, 2011; Teti, Shimizu, Crosby, & Kim, 2016; Wang et al., 2013). In the findings, there was also shown to be a link between sleep and nutrition, as it showed that an infant has increased oral feeding efficiency when alert while feeding, showing the need for oral sensory stimulation and multisensory interventions prior to feedings to improve alert states (Giffith, Rankin, & White-Traut, 2017).

When an infant has maladaptive behaviors, the findings show that behavioral training can lead to decreased sleep problems, such as facilitating bedtime routines, self-settling, extinction-based strategies, graduated extinction, adult fading, and parental presence (Crichton & Symon, 2016; Hiscock and Davey, 2018; Krader, 2018). Other parental interventions to promote quality and duration of sleep include mother therapeutic touch and maternal voice stimulus, which can be used before bedtime (Efendi, Caswini, Rustina, & Iskandar, 2018). There are also many strategies for nighttime anxieties, such transitional objects, reward charts, muscle relaxation, and more (Hiscock & Davey,

2012). Overall, parental education is very important, as parents are the determinant of whether infant sleep interventions will get implemented and consistency can lead to a decrease in negative sleep behaviors (McDowall, Elder, and Campbell, 2017).

Depending on the culture, parents may also have different sleep customs and outcomes, as different countries or people may have different values when it comes to sleep (Murray et al., 2019; Netsi et al., 2017; Smith, Liu, Helms, & Wilkerson, 2012). However, it is also imperative for occupational therapists to know that infants from people of color have a higher risk of SIDS due to extensive use of discouraged infant sleeping positions (Smith, Liu, Helms, & Wilkerson, 2012). Occupational therapists must address these cultural issues for client-centered care.

Overall, infant sleep is a problem for many families, and it is within an occupational therapists' scope of practice to inform and consult with families to increase infant sleep (AOTA, 2014). The need for consultation and increased number of families experiencing issues shows the need for an occupational therapy manual on infant sleep, as this synthesizes and consolidates information for therapists to use assess, analyze, and educate caregivers to promote sleep. The formation of an occupational therapist manual will be used to inform, educate, and consult with caregivers on the different aspects that go into healthy sleep promotion to increase the duration and quality of their infant's sleep. Alongside this manual, an assessment will be made to determine what aspects of sleep may be impacting the quality or quantity of an infant's sleep, as an occupational therapist may then use this information in conjunction with the manual to better inform and provide for the family.

CHAPTER III

METHODOLOGY

A manual for occupational therapists, titled *An Occupational Therapy Holistic Guide to Infant Sleep* was created to increase practitioner's knowledge to educate caregivers on a comprehensive and holistic approach to infant sleep and the different aspects that can affect it. A need for this product was identified through a detailed literature review. Topics that were included were the role of occupational therapy, assessment tools, interventions, modifications of the environment, sensory aspects, positioning, safety recommendations, effect of nutrition, behavioral training, and cultural differences. Relevant literature was found using multiple research databases including CINAHL, PubMed, ODIN, and Google Scholar. Keywords used when searching the databases for articles included: sleep, sleep routine, sleep hygiene, behavior, sleep training, sleep schedule, environment, education, positioning, feeding, sensory, sleep management, disordered, cultural differences, infants, kids, toddlers, and caregiver. The search results were utilized to gain an understanding of a holistic understanding of infant sleep. This information was then used to develop assessments for therapists to evaluate sleep with a holistic approach and create a guide for therapists to assist caregivers with improving their infant's sleep.

There were many themes in the literature showing that sleep is an occupation that can be affected or disrupted from many different things, such as sensory disruptions, environmental factors, nutrition, positioning/sleep location, routine, and more (Griffith,

Rankin, & White-Traut, 2017; Hiscock & Davey, 2012; Salls, Silverman, & Gatty, 2002; Tauman et al., 2017). There were many articles showing that there can be a number of factors that lead to decreased sleep, many of which are included or highlighted in this scholarly project. There were also patterns in the literature showing that parents were uneducated or misinformed about infant sleep, leading to a decreased ability to follow AAP guidelines for safety. The literature also brought to light different cultural aspects that may impact an infant's sleep and an increased risk of SIDS, showing a need for a holistic guide.

The Person-Environment-Occupation (PEO) Model of Occupational Performance was utilized to guide the literature review and the construction of the assessment tools and manual for therapists. This specific model was chosen because it considers the person, environment, and the occupation and the interactions that occur between these specific areas (Law et al., 1996). Before analyzing the transaction between the PEO elements, each of the person, environment, and occupation variables were examined separately. Factors for each are included in the following graph:

Person (Infant)	Environment (Place of sleep, people that make up social environment, etc.)	Occupation (Sleep)
Interests Values Spirituality Sensory abilities Motor abilities Development Life/Sleep skills	Resources Physical characteristics of home Family and friends Culture Location of sleep Bedroom setup Where parents are in relation to infant Socio-economic status	Time demands Organizational/physical requirements

After examining the person, environment, and occupation variables separately, the authors examined P-O, O-E, and P-E transactions to have a better understanding of how

all these things affect sleep for infants. These are the main areas of concern for consultation and education for the occupational therapist providing services. The transactions between the three main aspects of this model while examining the influential factors that impact infant sleep are provided below:

Person-Occupation	Occupation-Environment	Person-Environment
Supine positioning Nutrition Self-soothing ability (use of parental interventions) Anxiety or bedtime fears	Temperature of the room Noise in the environment The amount of light in a room Sleep location/Safety in crib Co-sleeping Parental education Routines	Decreased sleep due to sensory sensations Infant sleep machines Behavior training Technology use Routines Cultural/socio-economic differences

The authors believe that using the PEO model will allow them to gain an increased understanding of the different aspects of sleep impacting infants in order to create educational materials that will influence the occupational performance of future infants and families in need. This occupational therapy guide is intended to be used for families of infant's that have decreased sleep latency or sleep deprivation between the ages of 0-2. Current research addresses the needs of sleep in older children and adults, but there is a gap in the literature for the infant population. This population should not be overlooked, as sleep is detrimental to their overall physical, cognitive, and mental development.

Together, the authors developed this product by completing a thorough review of all relevant literature on the topic of infant sleep and by choosing an occupation-based

model to incorporate throughout. Chapter IV will present the product, *An Occupational Therapy Holistic Guide to Infant Sleep*.

CHAPTER IV

PRODUCT

An Occupational Therapy Holistic Guide to Infant Sleep

By: Mackenzie Danielson, MOTS, Karlie Marler, MOTS,

& Alyssa Turner-Strong, MOTS

Table of Contents

Introduction

This guide is intended for the use of occupational therapists to utilize when assessing, intervention-planning, and educating parents on the topic of infant sleep. This educational guide provides insight into the PEO model and how it can inform and be a way of analyzing infant sleep. It also provides an outline of the current infant assessments that are currently in use and the corresponding assessment made alongside this educational manual, called the *Holistic Infant Sleep Assessment.* This is an assessment meant to target what inhibits an infant's sleep through the lens of the PEO model. After the use of our assessment, this manual gives research-based strategies and interventions for an OT to use and implement or to educate others on. Overall, this occupational therapy guide was meant to be a holistic approach to assessing and implementing interventions to increase the duration and quality of infant sleep.

Theory: PEO Model

The Person-Environment-Occupation (PEO) Model of Occupational Performance is an occupational therapy model that was chosen to influence this educational guide, as it considers the person, environment, and the occupation, and the interactions that occur between these specific areas (Law et al., 1996). Before analyzing the transaction between the PEO elements, each of the person, environment, and occupation variables are examined separately. Factors for each are included in the following graph. A therapist can make their chart with the variables they see influencing each of these elements.

Person (Infant)	Environment (Place of sleep, people that make up social environment, etc.)	Occupation (Sleep)
Interests Values Spirituality Sensory abilities Motor abilities Development Life/Sleep skills	Resources Physical characteristics of home Family and friends Culture Location of sleep Bedroom setup Where parents are in relation to infant Socio-economic status Virtual Environment- technology they are around	Time demands Organizational/physical requirements

After examining the person, environment, and occupation variables separately, the P-O, O-E, and P-E transactions are examined for an increased understanding of how all the different elements and variables affect sleep in infants. The P-O, O-E, and P-E transactions contain the main areas of concern for consultation and education for the occupational therapist providing services. The transactions between the three main aspects of this model while examining the influential factors that impact infant sleep from the literature review are provided below:

Person-Occupation	Occupation-Environment	Person-Environment
Supine positioning: An infant sleeping in any position other than supine can be dangerous during infant sleep. Nutrition: The state of sleep an infant is in during feedings can impact both sleep and nutrition outcomes; feedings before bedtimes can also lead to decreased sleep latency. This shows the need for education/ change on feeding times and how to properly tell what sleep state the infant is in. To improve sleep quality and duration of sleep in infants at night, parental interventions (MVS/ MTT) can be used, which helps with self-soothing. Anxiety or bedtime fears may impact an infant's ability to sleep by themselves overnight, leading to the need for parental interventions for anxiety/fear.	The temperature of the room can impact the occupation of sleep, especially for infants, leading to a need for environmental modification. Noise in the environment can disturb sleep, leading to the need for noise management. The amount of light in a room can affect sleep, with infants needing managed/dimmed lights. Sleep location/Safety in crib: An infant sleeping outside a crib or bassinet during nights can lead to an increased chance of Sudden Infant Death Syndrome (SIDS); there are many safety elements of the crib that can lead to a higher chance of SIDs in infants as well. To ensure safety, OT's need to educate caregivers on proper safety elements of infant sleep and where they can/cannot sleep. Co-sleeping has some benefits, especially when the parent/infant are not sleeping in the same bed, however, it can be dangerous. Parental education- Many parents do not receive proper information or education on infant sleep, leading to increased use of dangerous practices, such as co-sleeping, positioning in prone, etc.	Decreased sleep due to sensory sensations in the infant's environment (textures of the bedspread, etc.) leads to the need for multisensory interventions such as (ATVV), multisensory routines, or environmental modification. Infant sleep machines can help infants to fall asleep faster, however, can be dangerous to the infant if placed too close in their environment. Behavior training: Parental response to their infants contributes to maladaptive coping behaviors in infants, leading to decrease in the amount of sleep and negative behaviors, leading to the need of parents to begin behavioral training. Decrease the use of technology before bedtime: Watching TV or using tablets can make it harder for infants/children to fall asleep when used or watched before bed. Routines: Infants need constant routines to promote sleep, leading to increased bedtime ease, sleep quality, and mood. Cultural/socio-economic differences impact infant sleep and risk for SIDs, showing the awareness OT's need to have.

Using the PEO model will allow therapists to gain an increased understanding of the different aspects of sleep impacting infants in order to use educational materials that will influence the occupational performance of future infants and families in need and use professional reasoning to make decisions about needed interventions. Overall, the goal is to make a better fit between the three elements. This occupational therapy guide is intended to be used for families of infants that have decreased sleep latency or sleep deprivation between the ages of 0-2. Current research addresses the needs of sleep in older children and adults, but there is a gap in the literature for the infant population. This population should not be overlooked, as sleep is detrimental to their overall physical, cognitive, and mental development.

Current Assessments

There are not currently many sleep assessments that can be used with infants. Below is a list of assessments that are currently being used by occupational therapists and other healthcare professionals when assessing sleep:

- **The Infant Sleep Questionnaire:** maternal self-report of sleeping behavior for 12-18-month-olds (Morrell, 2003).
  - Source: In the appendix of The Infant Sleep Questionnaire: A New Tool to Assess Infant Sleep Problems for Clinical and Research Purposes article

- **Brief Infant Sleep Questionnaire (BISQ)**: parent-report questionnaire on infants (0-29 months), focusing on sleep duration, night waking's, method of falling asleep (Sadeh, 2004).
  - Free to use for scientific (non-profit) purpose

- **Sensory Profile or Sensory Profile 2:** a measure of a child's/infant's responses to sensory events in daily life (Dunn, 2014).
  - High cost
  - Source: www.Pearsonassessments.com

- **BEARS Sleep Screening Tool:** free instrument that is divided into five major sleep domains (bedtime problems, excessive daytime sleepiness, awakenings during the night, regularity and duration of sleep, and snoring), providing a comprehensive screen for the major sleep disorders affecting children in the 2-to-18-year-old range. Each sleep domain has a set of age-appropriate "trigger questions" for use in the clinical interview (Shahid, Wilkinson, Marcus, & Shapiro, 2011).
  - Free of cost
  - Source: Online access

The Holistic Infant Sleep Assessment

Since there are not many infant sleep assessments that are theory-based and comprehensive to the variables impacting infant sleep, the authors created the *Holistic Infant Sleep Assessment.* This assessment is based upon the PEO model, with there being a Person-Occupation section, Occupation-Environment section, and a Person-Environment section. Each section targets different variables by asking specific yes or no questions for the caregiver to answer, which are important when addressing the many factors which may be affecting the infant when sleeping.

The beginning of the assessment asks the caregiver information on them and their infant such as infant name, caregiver role, age of the infant, race/ethnicity, hours of sleep infant gets, and current caregiver knowledge/ education on sleep. Variables under Person-Occupation that are asked about include: positioning, nutrition, maternal/paternal interventions, and parental interventions for anxiety/ fear. The Occupation-Environment section contains questions for the caregiver about: room modifications, sleep location and safety, and routines. For the Person-Environment section, the variables include sensory aspects, infant sleep machines, behavior training, and technology use. All these comprehensive topics will give the occupational therapist a guide to what may be affecting the infant and what they will need to do/ provide education for.

To score this assessment, the occupational therapist must add up the checked number of square boxes (as this corresponds with a yes 50% of the time). There will then be a score under each section: Person-Occupation, Occupation-Environment, and Person-Environment. No checkmarks in that section mean that the infant is not having any problems in that transaction area. If there are 1-3 checkmarks in a section, then the

section is a low priority and may need intervention. If there are 4-7 checkmarks, then the transaction area needs to be addressed and requires intervention or parental education. If there are 8 or more checkmarks, then that transaction area is a high priority and must be addressed first. This scoring system shows if the PO, OE, or PE has the least amount of fit. It may be one area, two, both, or neither.

This assessment, when paired with *An Occupational Therapy Holistic Guide to Infant Sleep* intervention strategies and education, will give the occupational therapist knowledge on how to address the needs laid out in this assessment form. If an infant has the most problems within the Person-Occupation section, for example, then the occupational therapist should next find the Person-Occupation section within the educational manual to read the strategies and interventions listed on how to help the infant. The next page contains pictures of the assessment; however, it is also provided alongside this educational manual for therapist printing and use.

HOLISTIC INFANT SLEEP ASSESSMENT

Name: Caregiver Role:

Infant Name: Sex:

Chronological Age: Corrected Age:

Race/Ethnicity:

On average, how many hours does your infant sleep a night?

Have you had previous education on infant sleep?

Directions: Fill in the box if it applies to your infant at least 50% of the time.

PERSON-OCCUPATION VARIABLES

Positioning

- ☐ Do you place the infant on their side or stomach when it is time for bed?
- ☐ Do you find your infant sleeping on their side or stomach even when you have placed them on their back prior to bedtime?

Nutrition:

- ☐ Do you feed your infant right before putting them to sleep?
- ☐ Is your infant feeding while asleep/while drowsy during the night feeding sessions?
- ☐ Do you feed your infant to help soothe him/her back to sleep?

Maternal/Parental Interventions:

- ☐ Is your infant not able to sleep through the night at what you would expect for an infant their age?
- ☐ Does it take longer than 10 minutes for your infant to fall asleep at night?
- ☐ Do you have to be present for the entire duration that your infant is falling asleep?
- ☐ Does your infant need help soothing when upset at night/during the night?

Parental interventions for Anxiety/Fear

- ☐ Does your infant appear to be afraid or anxious at night/when left alone?
- ☐ Does your infant wake with seeming nightmares often?
- ☐ Does your infant need reassurance more than once a week because of bedtime fears?

OCCUPATION-ENVIRONMENT VARIABLES

Room Modification (Temperature, Noise, Light)

- ☐ Is your infants' room above 68 degrees Fahrenheit?
- ☐ Is your infant's room below 61 degrees Fahrenheit?

- ☐ Is there a lot of noise in the infant's room while they are sleeping? (Noises that lead to decreased sleep/wake them up)
- ☐ Is there a lot of noise commonly outside of the infant's room while they are asleep? (Noises that wake them up often)
- ☐ Are there overhead lights on in the infant's room while they are sleeping?
- ☐ Are there many small lights on in the infant's room while they are sleeping? (More than two lights)

Sleep Location/ Safety in the rib/ Co-Sleeping:

- ☐ Does your infant sleep in bed with you/another caregiver?
- ☐ Does your infant sleep somewhere other than a crib or bassinet at night?
- ☐ Does your infant sleep with sheets, blankets, or pillows in the crib?
- ☐ Does your infant's crib have stuffed animals/toys in it?
- ☐ Are there bumper pads on the infant's crib?

Routines

- ☐ Do you have a set bedtime routine/ritual that you use with your infant prior to sleep?
- ☐ Does your infant go to bed at or around the same time every night?
- ☐ Does your infant sleep in the same place every night?

PERSON-ENVIRONMENT VARIABLES

Sensory

- ☐ Does the infant appear to be bothered by certain fabrics or textures? (hands splaying, crying at the touch of different fabrics, avoidant of different textures, etc.)
- ☐ Is your infant often bothered by or sensitive to loud sounds, bright colors/lights, many people in a room, or different temperatures? (Sensory Sensitivity)
- ☐ Is your infant often crashing into items, seen jumping, or like deep pressure? (Sensation Seeking)
- ☐ Does your infant elicit negative behaviors when exposed to or aware of certain sensations, sounds, or environments? (Sensation Avoiding)

Infant Sleep Machines

- ☐ Is there a noise machine on or near (within 3 feet) of the infant's crib/place of sleep?
- ☐ Does the noise machine play for longer than 1 hour?
- ☐ Do you leave the noise machine on for the full night?

Behavior Training

- ☐ Does your infant cry at night when lying them down to sleep?
- ☐ Does your infant cry in the middle of the night until you pick them up/sleep with them?
- ☐ Does your infant need you/the caregiver in the room in order to self-soothe when upset?

Technology Use

- ☐ Does your infant watch TV/movies prior to going to bed? (within 45 minutes of going to bed)

☐ Does your infant watch/play on an iPad or electronic device prior to sleeping? (within 45 minutes of going to bed)

SCORING

Add up the checked number of square boxes in each section and write them below in the corresponding sections.

Person-Occupation_____

Occupation-Environment_____

Person-Environment_____

0 Checkmarks in a section: No problems
1-3 Checkmarks in a section: Low priority
4-7 Checkmarks in a section: Transaction area needs to be addressed
8+ Checkmarks: High priority, Transaction area must be addressed first

Author Note:

This assessment was made by the creators using the concepts from the PEO model, while addressing the different factors that may play a role in affecting infant sleep. Occupational therapists may use this as a guide to determine if an infant/family needs education, intervention, or consultation. This assessment may also inform the therapist on what areas need to be prioritized or addressed first. This assessment was formed to use in conjunction with the educational guide titled, *An Occupational Therapy Holistic Guide to Infant Sleep*. This guide provides insight into the different intervention and education areas outlined in this assessment.

Theory within assessment influenced by:

Law, M., Cooper, B., Strong, S., Stewart, D., Rigby, P., & Letts, L. (1996). The Person-Environment-Occupation Model: A Transactive Approach to Occupational Performance. *Canadian Journal of Occupational Therapy*, *63*(1), 9–23. doi: 10.1177/000841749606300103

Strategies and Interventions

Person-Occupation Variables

Positioning

Sleep and play positioning that is used during the day both affect infant gross skills and an infant's occupational development. Sleep positioning is of utmost importance, as it can also be a safety hazard if an infant is sleeping in an unrecommended sleep position. One hazardous outcome of using unrecommended sleeping positions is the risk of SIDS, which is Sudden Infant Death Syndrome. The table below covers different positioning and the facts on when/how to use them.

Supine	Supine is a position in which the infant is lying on their back. • This is the ONLY recommended position for infants while sleeping. • This position is the safest, as it leads to a higher number of arousals which is highly linked to a decrease in SIDs and accidental smothering. (Salls, Silverman, & Gatty, 2002)
Prone	Prone position means that an infant is lying on their stomach. • This is not a recommended sleeping position, as it may lead to an increased risk of SIDS. • Prone positioning is important to incorporate during the day while the infant is awake to gain proper gross motor milestones and development, also called "tummy time". (Kato et al., 2006; Salls, Silverman, & Gatty, 2002)
Sidelying	Sidelying position is one in which the infant is lying on their side while sleeping. • This position is not recommended for sleeping, as it may lead to an increased risk of SIDS in infants. (Kato et al., 2006; Salls, Silverman, & Gatty, 2002)

Nutrition

There is a relationship between sleep and nutrition, as an infant's ability to transition between behavioral states is determined by the infant's ability to self-regulate in response to internal/external stimuli which may also influence oral feeding efficiency.

Unsuccessful feeders: Infants who struggle with feeding, which may lead to a decrease in health.

- Research shows that unsuccessful feeders spent more than 50% of their feeding in sleep states.

Successful feeders: Infants who are successful during feedings and get the nutrition required for functioning and thriving.

- Research shows that successful feeders spent their feedings in alert states or crying, which led to increased oral feeding efficiency.
- Therefore, forced oral feedings while an infant is asleep should be avoided when possible.

(Giffith, Rankin, & White-Traut, 2017)

Below are interventions to improve the transition to alert states to be used prior to feeding.

Oral Sensory Stimulation	*Facial-Oral Muscle Tone:* Tapping on the facial muscles around the mouth or using light touch around the mouth and cheeks to stimulate the muscles and increase tone before oral feedings. *Pre-Feeding Stroking:* Stroking the infant in and around the mouth pre-feeding for 5 minutes. (Manno, Fox, & Eicher, 2005)

Non-Nutritive Sucking	Let infant suck on pacifiers, fingers, infant chewies prior to feedings
Multisensory Interventions	Incorporating different types of arousing sensory stimuli prior to feedings: *Rocking* o Fast as to alert the baby o Unpredictable movements *Bouncing* o Bounce the baby from side to side or up and down *Lights* o Bringing them to a brighter area o Space near a window with natural light *Music* o Playing songs o Mouth noises (buzzing like a bee, clicking tongue, humming) o Blowing raspberries (blowing on infant's stomach) *Light touch* o Touch the infant lightly along the face or body for an alerting effect *Vibration* o Vibrating stuffed animals and toys o Vibrating toothbrush against cheeks/lips *Cooler temperatures* o Turning on the AC o Use a fan o Open a window *Oil diffuser* o Using alerting scents such as peppermint or lemon (Heffron, 2018) Can also incorporate the multisensory intervention *ATVV* before feedings by following the steps below: 1. Talk to the infant with eye contact. 2. Give the infant a head massage with 6-10 strokes. 3. Give infant's arms a massage/strokes with 6 times per arm. 4. Give infant's legs a massage/strokes with 6 times per leg. 5. Chest and belly massage. 6. Back massage with circular motions. 7. End with rocking for 5 minutes, preferably quick as to alert the infant. (Giffith, Rankin, & White-Traut, 2017)

Maternal/Parental Interventions

Mother Therapeutic Touch (MTT) and Maternal Voice Stimulus (MVS) have both been found to improve the quality and duration of sleep in infants and even reduce their heart rate. They are parental interventions that can be done by either parent and may help soothe an infant before sleep.

Intervention	Definition & Benefits	How to use it
Mother Therapeutic Touch (MTT)	Defined as an effort to give comfort by using the hands of the infant's mother. Benefits: This intervention increases an infant's quality and duration of sleep	1. Parent warms up hands for 2 minutes prior. 2. While breathing slowly and rhythmically, slant the infant to the right or left side while flexing the infant's body. Position the parent's hands close to the infant's mouth while flexing the infant's legs close to the tummy. 3. The parent places one palm of one hand above the infant's neck and head. The other hand is rested on the infant's lower abdomen, encompassing the infant's waist and hips. 4. Continue for 15 minutes before careful removal of hands from the infant.
Maternal Voice Stimulus (MVS)	Defined as music therapy which is sung by the infant's mother using traditional music, often referred to as lullabies. Benefits: Infants using this were able to maintain their sleep longer than infants who did not use this.	1. Select a song with constant and stable rhythms, predictable tones, and repeated lyrics a. For the research study, the song "Nina Bobo" was used. 2. One parent records themselves singing the song for 15 minutes straight on a recording device. 3. With the volume set to less than 65 dB, the lullaby is then played near the infant's head and turned off after 15 minutes.

(Efendi et al., 2018)

Parental Intervention for Anxiety/Fear

Nighttime fears and anxieties may be present in infants, as some may refuse to sleep by themselves overnight; occasionally, bedtime problems are due to an anxiety disorder such as separation anxiety. These intervention ideas are for older infants/ young children. Some parental interventions and support strategies that could benefit include:

Camper Beds	Putting a temporary bed next to the child's bed in their bedroom so that they feel comforted as they are falling asleep. However, if this is done too much, it may make the infant/child dependent upon the parent being there to fall asleep. It is suggested to only use this when necessary.
Transitional Objects	It may help if the infant is allowed to take an object into bed with them (if they are over the age of 1), such as a favorite doll or stuffed animal which may make the transition to sleep easier. For increased safety, it is suggested to put the transitional object next to the crib/bed so that the infant can see the comforting object. The object can also be an object of the parents, which may be comforting for the infant.
Breathing exercises/Visual Imagery	*Breathing exercises:* Breathing slowly in and out and encourage the child to breathe at the same rate. You can place their hand on your chest or your hand on theirs so that they can feel/know the rate of breathing and have increased understanding. Make a point to make your breaths loud so that they understand to blow out and when to take deep breaths. *Visual Imagery:* This may work for small children if the parent describes a relaxing and peaceful setting, describing things such as a beach, meadow, or forest. This works like a story but gives them something to visualize. It is important to talk slowly and peacefully as this may benefit them even if they cannot understand what is being said.
Positive Self-Statement	Parent tells the child positive statements every night such as "you are brave," etc. The infant can repeat them or come up with their own.
Worry Box	Have a box labeled the worry box. If an infant is allowed to describe at all what they are scared about or gesture to what it is, the parent can write it and put it in the worry box, meaning that the child will then be safe.

Sticker Chart	This chart is used to reward brave behavior. For instance, if the infant stays in their crib/bed without trying to escape or leave the room, then they get their favorite stickers stuck to a sticker chart. This may also coincide with a reward if a certain number of stickers are obtained.

(Hiscock & Davey, 2012)

Occupation-Environment Variables

Room Modification

Modification of an infant's room is an important factor to assist an infant in improving sleep and assisting an infant sleeping longer. The temperature of the room, sound, and lighting are important parts of modifying the environment. Through the reduction of avoidable noises, it can help to decrease the likelihood of awakenings because of noises. Overall, the room should have a relaxing and calming feel to it.

(Orsi et al., 2015)

Recommendations:

Temperature

- Ideal temperature 61 - 68 degrees Fahrenheit (16-20 degrees Celsius)

Lighting

- Lights should be dimmed

Noises

- Reduce avoidable noise
    - Sound machines
    - Televisions
    - Computer games

(Crawford, 2017)

Sleep Location, Safety in the Crib, and Co-Sleeping

Safety

To assist with the reduction of accidental suffocation and strangulation in bed it is recommended that the location of where the infant sleeps has minimal pillows, blankets, stuffed animals, etc. Pillows and blankets are the most common non-sleeping objects that increase the risk of infant death.

Things to reduce/remove from an infant's sleeping area:

- Pillows
- Extra blankets
- Wedges
- Stuffed animals
- Bumper pads

Recommendations:

- Ensure that there is no space between the mattress and the crib, bassinet, or portable crib
- Ensure that bedding is not loose (use fitted sheet)
- Recommend that the infant is not positioned between objects when sleeping
- Use caution when napping or sleeping with an infant in a place other than their crib.
- Use a firm sleep surface (crib mattress covered by a fitted sheet)
- A crib, bassinet, or portable crib that conforms to the safety standards of the Consumer Product Safety Commission and ASTM International
- Check to make sure that the crib/product has not been recalled

- Replace any broken or missing pieces right away
- Use mattresses designed for the specific product
- Recommend not using soft objects, bumper pads, and loose bedding
- Swaddling is appropriate when the infant is positioned supine

(American Academy of Pediatrics, 2011; Gaw et al, 2017; Kelly et al., 2016)

Sleep Location

Persistent co-sleeping has correlations with increased sleep disturbances and an increased number of night awakenings in infants. There is also an association of co-sleeping with marital and co-parenting distress, decreased maternal emotional availability, elevated family stress, and a higher risk of SIDS. Although research has found that co-sleeping puts infants at an increased risk of SIDS, there are still many cultures that believe in co-sleeping. It is important to be respectful of others' beliefs while recommending the safest sleep location possible for an infant.

(Teti, Shimizu, Crosby, & Kim, 2016)

Recommendations:

- Encourage caregivers to place their infant in a crib, bassinet, or portable crib
- Highly encourage not sleeping with infant in bed with caregivers to reduce the number of night awakenings and reduce the risk of SIDS
- If co-sleeping is the only option
    - Recommend decreasing the number of blankets, pillows, soft objects, etc.
    - Remember to be considerate of a person's cultural beliefs as some culture's infants sleep with their caregivers

(Teti, Shimizu, Crosby, & Kim, 2016; Netsi et al., 2017)

Routines

Routines are critical to good sleep hygiene, specifically regarding consistent sleep schedules and pre-sleep routines. Implementation of a nighttime/sleep routine for infants is a factor that impacts infant sleep. Routines benefit infants by providing them with a sense of predictability and security. Through the use of a consistent nighttime routine, infants were found to have better sleep outcomes. A simple, consistent bedtime routine, consisting of a bath, massage and quiet activities, resulted in rapid change for both child-level sleep variables as well as the mother's perception of her child's bedtime ease, sleep quality, and mood.

(Bathory & Tomopoulos, 2017; Hiscock & Davey, 2012; Leichman et al., 2017)

<u>Recommendations:</u>

- Implement a consistent 30-45-minute routine before bed
    - Bedtime should be between 7 and 8 P.M.
    - Create a calming environment
        - Dimmed lighting
        - Reduction of noise
        - Reading books
        - Swaddling (ensure that the infant is in supine when swaddled)
        - Pacifier use
    - Feeding should be included within this routine, but not be the last step before bed
    - Put the infant to bed drowsy but still awake
    - Avoid rocking and feeding to sleep
    - Allow time for the infant to self-soothe
    - Ensure the infant has a nap routine during the day

(Kelly et al., 2016; Leichman et al., 2017; Mindell et al., 2018; Paul et al., 2016)

- If night awakenings are an issue:
  - Stop walking infant routinely to feed
  - Feed before caregivers' bedtime until 4 months
  - Allow time for the infant to self-soothe
  - Do not reinforce waking

(Paul et al., 2016)

Nighttime routine examples:

1. Talk to the infant with eye contact.
2. Give the infant a head massage with 6-10 strokes.
3. Give infant's arms a massage/strokes with 6 times per arm.
4. Give infant's legs a massage/strokes with 6 times per leg.
5. Chest and belly massage.
6. Back massage with circular motions.
7. End with rocking for 5 minutes, preferably quick as to alert the infant.

(Griffith, Rankin, & White-Traut, 2017)

1. Bath (with a minimum of 5 minutes using products provided for washing)
2. Massage (with a minimum of 3 minutes with suggested techniques, using the provided massage product)
3. Quiet activities (i.e. cuddling, singing)

Recommended: Lights being out within 30 minutes of the end of the bath.

(Leichman et al., 2017)

Person-Environment Variables

Sensory Systems

There are a variety of sensory factors to look at when determining an infant's problem area. There are four sensory systems to look at including low registration, sensation seeking, sensory sensitivity, and sensation avoiding.

Low registration	When an individual has a high sensory threshold with passive responding strategies; they would tend to not notice things in the environment, which causes a lack of movement, triggering the nervous system to shut down and stop processing information which makes them seem lethargic or uninterested in their surroundings.
Sensation seeking	When they have a high sensory threshold with active responding strategies, which would show the infant/child being highly interested in movements, pressure, lights, colors, sounds, smells, and tastes which leads to excessive jumping, licking, crashing into items, etc.
Sensory sensitivity	Low sensory threshold with passive responding strategies; this means that a person is more aware and sensitive to the surrounding forms of input around them, being bothered by loud sounds, bright lights or colors, many people in a room, temperatures, and more.
Sensation avoiding	When a person has a low sensory threshold with active responding strategies, which means they have a heightened awareness and response to sensations, sounds, and environments with any stimuli potentially sending the person into a negative behavior response.

(Dunn, 2014; Tauman et al., 2017)

ATVV: Auditory, Tactile, Visual & Vestibular

Multisensory interventions can be used when an infant is waking or prior to sleep). ATVV is an intervention that can be used to facilitate increased sleeping and/or eating habits by using an infant's sensory system. The combination of using these different sensations may improve an infant's arousal from sleep in order to begin oral feeding.

(Griffith, Rankin, & White-Traut, 2017)

Step 1:	Begins with infant directed talk (auditory)
Step 2:	Make eye contact (visual)
Step 3:	Head massage with 6-10 strokes (tactile) Arm massage with 6 times each arm (tactile) Leg massage with 6 times each leg (tactile) Chest and belly massage (tactile) Back massage with circular motions (tactile)
Step 4:	Finish with rocking for 5 minutes (vestibular)

(Griffith, Rankin, & White-Traut, 2017)

Nightly Routine

By implementing this three-step multi-sensory routine, infants had improvements in sleep onset latency, decreased night awakenings and increase duration, longer stretches of sleep, bedtime ease, improved infant morning mood, and improved parental perceptions of how the infant slept.

1. Bath (with a minimum of 5 minutes using products provided for washing)
2. Massage (with a minimum of 3 minutes with suggested techniques, using the provided massage product)
3. Quiet activities (i.e. cuddling, singing)

Recommended: Lights being out within 30 minutes of the end of the bath.

(Leichman et al., 2017)

Infant Sleep Machines

Infant sleep machines (ISMs) make ambient noise or different noises to cover up other sounds in an infant's room with the goal of increasing uninterrupted sleep by soothing the infant or preventing arousal.

- It is recommended that if used, noise machines should be placed as far away as possible from the infant and never in or near the crib.
- ISM should be at a low volume and only for a short duration and not constantly throughout the night.
- Sound machines noises include:
    - White noise
    - Nature sounds (including rain, thunder, wind, ocean, river, campfire, insect, and bird sounds)
    - Mechanical sounds (including traffic, train, airplane, and machinery sounds, and heartbeats)

(Hugh et al., 2014)

Behavior Training

- Parental response to their infants at night during sleep may contribute to maladaptive coping behaviors by infants, resulting in a decrease in sleep and continued negative behaviors.
- The success of behavioral strategies with parents is reliant upon information given, such as the quality and amount, with active preventative intervention improving sleep in the early months for infants.
- The use of education about infant sleep patterns, routines, and parental behavior to facilitate self-settling or self-soothing has been effective.
- The more direct the advice to place the infant down awake and minimize responding, the greater the success with the intervention strategy.
- Place in the cot/crib while awake to self-settle, to keep parental interaction within a block of sleep to a minimum, to include a “focal feed” to help increase feeding intervals at night, and to differentiate between day and night.
- Parents should be assisted with techniques to enable them to be consistent which results in a change in the infant's behavior. These techniques should be implemented in the infant’s early stage sand carried out through their development.

(Crichton & Symon, 2016; Hiscock & Davey, 2018)

Behavioral Management Strategies

- Extinction-based strategies such as, where parents let the infants "cry it out" without responding immediately, with hopes of the infant self-soothing and returning to sleep.
- One of the most important learned sleep behaviors in infancy is the ability to self-soothe and fall asleep independently. To promote self-soothing, it is recommended that infants learn how to fall asleep independent of a caregiver, after a bedtime routine. This ability to self-soothe allows infants to more rapidly return to sleep after the many physiologic arousals that occur throughout the night, and thus have more consolidated and less fragmented nighttime sleep.
- Healthy sleep patterns can be established, and sleep problems can be prevented and managed through sleep-promoting parenting practices, or good "sleep hygiene". Good quality sleep, particularly nighttime sleep, encourages full daytime alertness.
- It is important for an infant to learn to self-settle, rather than having to rely on an adult prior to nighttime. Some behavior management strategies than promotes self-settling and self-soothing are graduated extinction (also known as controlled crying or controlled comforting), adult fading (aka camping out), and parental presence.
    - *Graduated extinction* is when a parent places an infant in the cot/crib and stays with them, patting or stroking them until quiet but not asleep.

- The parent then leaves the bedroom and if the infant cries, the parent returns to settle the infant in the cot at increasing time intervals, for example, 2, 4, 6, 8, 10 minutes.

This approach takes approximately 3-7 nights to start working so it should be tried consistently. The steps for *adult fading*:

- The parent places a camp bed or chair next to the cot; For the first few nights, parents pat their infant to sleep and when the infant is settling with this, the parent spends the next few nights next to the cot but not touching their infant.
- The parent then moves their bed/chair out of the infant's room over 1-3 weeks and if the infant wakes overnight, the parent returns to the chair/bed and repeats the same process.
- For parental presence, it is a version of adult fading whereby the parent stays in the bed/chair for the whole night over a period of 7 nights with the parent minimizing touching/talking to the infant.

Each of these methods is found to be effective in research for infants above six months and should be explained to parents who then decide which strategy they want to pursue.

(Bathory & Tomopoulos, 2017; Hiscock & Davey, 2012; Crichton & Symon, 2016; Črnčec, Matthey, & Nemeth, 2010; Krader, 2018; Hiscock & Davey, 2012)

Technology Use

Decreasing visual stimuli prior to sleep such as limiting screen including:

- Use of computers
- Video games
- Television sets
- Particular hand-held personal electronic devices

There is increasing evidence and concern that media use is interfering with sleep both neuro-physiologically and by replacing sleep time. The popularity of mobile devices such as tablets and smartphones in recent years has compounded this problem, showing the need for decreased technology before bed to limit visual stimuli.

(Bathory & Tomopoulos, 2017)

Case Study

Sam is a six-month-old male infant born to Angela, a first-time mother. Sam's mother reports that Sam struggles to fall asleep at night, taking hours to soothe and fall asleep, often leading Angela to rock him to sleep and carefully placing him in his crib while he is asleep. He wakes up multiple times a night and only soothes and falls asleep while she gives him a nighttime feeding. He does not have a consistent place to sleep, as they do co-sleeping, as well as crib sleeping. Sam's crib is filled with lots of stuffed animals and has an abundance of blankets. His crib is also lined with bumpers. Angela has trialed leaving the TV on throughout the night along with sound machines that stay on until morning. Sam wakes up sweating most nights, so Angela uses a fan to help cool him down at night. Angela is unsure of the problem that impacts Sam's sleep and is frustrated as a first-time mother with not knowing what to do to help him. She also does not know if her sleep practices are safe for her son. The next page contains the contents of the assessment filled out by Sam's mother, Angela, given by an occupational therapist.

HOLISTIC INFANT SLEEP ASSESSMENT

Name: Angela Weber

Caregiver Role: Mom

Infant Name: Sam Weber

Sex: M

Chronological Age: 6 months

Corrected Age: 6 months

Race/Ethnicity: Caucasian

On average, how many hours does your infant sleep a night? 11 hours

Have you had previous education on infant sleep? No

Directions: Fill in the box if it applies to your infant at least 50% of the time.

PERSON-OCCUPATION VARIABLES

Positioning

- ☐ Do you place the infant on their side or stomach when it is time for bed?
- ☐ Do you find your infant sleeping on their side or stomach even when you have placed them on their back prior to bedtime?

Nutrition:

- ☐ Do you feed your infant right before putting them to sleep?
- ☐ Is your infant feeding while asleep/while drowsy during the night feeding sessions?
- ✓ Do you feed your infant to help soothe him/her back to sleep?

Maternal/Parental Interventions:

- ✓ Is your infant not able to sleep through the night at what you would expect for an infant their age?
- ☐ Does it take longer than 10 minutes for your infant to fall asleep at night?
- ☐ Do you have to be present for the entire duration that your infant is falling asleep?
- ✓ Does your infant need help soothing when upset at night/during the night?

Parental interventions for Anxiety/Fear

- ☐ Does your infant appear to be afraid or anxious at night/when left alone?
- ☐ Does your infant wake with seeming nightmares often?
- ☐ Does your infant need reassurance more than once a week because of bedtime fears?

OCCUPATION-ENVIRONMENT VARIABLES

Room Modification (Temperature, Noise, Light)

- ✓ Is your infants' room above 68 degrees Fahrenheit?
- ☐ Is your infant's room below 61 degrees Fahrenheit?

- ✓ Is there a lot of noise in the infant's room while they are sleeping? (Noises that lead to decreased sleep/wake them up)
- ✓ Is there a lot of noise commonly outside of the infant's room while they are asleep? (Noises that wake them up often)
- ☐ Are there overhead lights on in the infant's room while they are sleeping?
- ✓ Are there many small lights on in the infant's room while they are sleeping? (More than two lights)

Sleep Location/ Safety in the rib/ Co-Sleeping:

- ✓ Does your infant sleep in bed with you/another caregiver?
- ✓ Does your infant sleep somewhere other than a crib or bassinet at night?
- ✓ Does your infant sleep with sheets, blankets, or pillows in the crib?
- ✓ Does your infant's crib have stuffed animals/toys in it?
- ✓ Are there bumper pads on the infant's crib?

Routines

- ✓ Do you have an irregular bedtime routine/ritual prior to bedtime?
- ✓ Does your infant go to bed at different times every night?
- ✓ Does your infant sleep in a variety of places every night?

PERSON-ENVIRONMENT VARIABLES

Sensory

- ✓ Does the infant appear to be bothered by certain fabrics or textures? (hands splaying, crying at the touch of different fabrics, avoidant of different textures, etc.)
- ✓ Is your infant often bothered by or sensitive to loud sounds, bright colors/lights, many people in a room, or different temperatures? (Sensory Sensitivity)
- ☐ Is your infant often crashing into items, seen jumping, or like deep pressure? (Sensation Seeking)
- ☐ Does your infant elicit negative behaviors when exposed to or aware of certain sensations, sounds, or environments? (Sensation Avoiding)

Infant Sleep Machines

- ✓ Is there a noise machine on or near (within 3 feet) of the infant's crib/place of sleep?
- ☐ Does the noise machine play for longer than 1 hour?
- ✓ Do you leave the noise machine on for the full night?

Behavior Training

- ✓ Does your infant cry at night when lying them down to sleep?
- ☐ Does your infant cry in the middle of the night until you pick them up/sleep with them?
- ☐ Does your infant need you/the caregiver in the room in order to self-soothe when upset?

Technology Use

- ✓ Does your infant watch TV/movies prior to going to bed? (within 45 minutes of going to bed)
- ☐ Does your infant watch/play on an iPad or electronic device prior to sleeping? (within 45 minutes of going to bed)

SCORING

Add up the checked number of square boxes in each section and write them below in the corresponding sections.

Person-Occupation_____3_____

Occupation-Environment_____12_____

Person-Environment_____6_____

0 Checkmarks in a section: No problems
1-3 Checkmarks in a section: Low priority
4-7 Checkmarks in a section: Transaction area needs to be addressed
8+ Checkmarks: High priority, Transaction area must be addressed first

Author Note:
This assessment was made by the creators using the concepts from the PEO model, while addressing the different factors that may play a role in affecting infant sleep. Occupational therapists may use this as a guide to determine if an infant/family needs education, intervention, or consultation. This assessment may also inform the therapist on what areas need to be prioritized or addressed first. This assessment was formed to use in conjunction with the educational guide titled, *An Occupational Therapy Holistic Guide to Infant Sleep*. This guide provides insight into the different intervention and education areas outlined in this assessment.

Theory within assessment influenced by:

Law, M., Cooper, B., Strong, S., Stewart, D., Rigby, P., & Letts, L. (1996). The Person-Environment-Occupation Model: A Transactive Approach to Occupational Performance. *Canadian Journal of Occupational Therapy*, *63*(1), 9–23. doi: 10.1177/000841749606300103

Interpretation of Results

Through the assessment, the findings showed that Sam is showing difficulty with having a consistent nighttime routine, leading to him falling asleep at different times at night and sleeping in a variety of places. Noise may be beneficial to helping Sam fall asleep, however having him be exposed to sleep machines through the night and within close proximity of Sam's head can be dangerous for him. According to the assessment, Sam may be sensitive to sensory aspects of his environment, such as by the materials in his crib, the temperature of the room, by the noise inside and outside of his room, or the many lights. Sam's mother soothes him back to sleep by feeding, showing that Sam lacks the ability to self-soothe and is dependent upon his mother to assist him in falling back to sleep each time. At times, Angela will take him from the crib and bring him into her bed to sleep, which can be a hazard to Sam, as bed-sharing can lead to a higher instance of SIDS. Sam's crib is full of stuffed animals, blankets, and bumper pads, which also lead to an increase in SIDS.

Interventions/Recommendations for the occupational therapist

Routines

The occupational therapist should recommend Angela to start initiating a consistent routine for Sam for his nighttime routine. Since Sam was found to have sensory issues, a nighttime routine that incorporates sensory will be beneficial. By implementing a consistent routine, Sam will develop an expectation of his nightly routine and will assist him in falling asleep and staying asleep longer. Below are examples of nighttime routines.

1. Talk to the infant with eye contact. 2. Give the infant a head massage with 6-10 strokes. 3. Give infant's arms a massage/strokes with 6 times per arm. 4. Give infant's legs a massage/strokes with 6 times per leg. 5. Chest and belly massage. 6. Back massage with circular motions. 7. End with rocking for 5 minutes, preferably quick as to alert the infant.
1. Bath (with a minimum of 5 minutes using products provided for washing) 2. Massage (with a minimum of 3 minutes with suggested techniques, using the provided massage product) 3. Quiet activities (i.e. cuddling, singing) Recommended: Lights being out within 30 minutes of the end of the bath.

Sensory Modifications

- Temperature of the room should be between 61-68 degrees, to prevent Sam from getting too warm.
- Sounds outside of the room should be limited to not disturb him.
- Sound machines can be beneficial to aid in sleeping, however, for safety purposes, needs to be placed away from the crib and on a lower volume.
- Textures of sheets in bed should be non-abrasive and changed as Sam gets a negative reaction from touching them.

Safety

The occupational therapist should educate Angela on safe sleeping practices such as:

- Co-sleeping can be beneficial as long as there is no bed-sharing happening, as it can lead to an increase in SIDS.
  - The baby needs a consistent schedule, so it is recommended that Sam gets into the routine of sleeping in his crib each night.
- All items in the crib should be taken out, such as toys, stuffed animals, extra blankets, and bumpers to decrease the risk of SIDS.

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Appendix

HOLISTIC INFANT SLEEP ASSESSMENT

Name: Caregiver Role:

Infant Name: Sex:

Chronological Age: Corrected Age:

Race/Ethnicity:

On average, how many hours does your infant sleep a night?

Have you had previous education on infant sleep?

Directions: Fill in the box if it applies to your infant at least 50% of the time.

PERSON-OCCUPATION VARIABLES

Positioning

☐ Do you place the infant on their side or stomach when it is time for bed?

✓ Do you find your infant sleeping on their side or stomach even when you have placed them on their back prior to bedtime?

Nutrition:

☐ Do you feed your infant right before putting them to sleep?

☐ Is your infant feeding while asleep/while drowsy during the night feeding sessions?

☐ Do you feed your infant to help soothe him/her back to sleep?

Maternal/Parental Interventions:

☐ Is your infant not able to sleep through the night at what you would expect for an infant their age?

☐ Does it take longer than 10 minutes for your infant to fall asleep at night?

☐ Do you have to be present for the entire duration that your infant is falling asleep?

☐ Does your infant need help soothing when upset at night/during the night?

Parental interventions for Anxiety/Fear

☐ Does your infant appear to be afraid or anxious at night/when left alone?

☐ Does your infant wake with seeming nightmares often?

☐ Does your infant need reassurance more than once a week because of bedtime fears?

OCCUPATION-ENVIRONMENT VARIABLES

Room Modification (Temperature, Noise, Light)

☐ Is your infants' room above 68 degrees Fahrenheit?

☐ Is your infant's room below 61 degrees Fahrenheit?

- ☐ Is there a lot of noise in the infant's room while they are sleeping? (Noises that lead to decreased sleep/wake them up)
- ☐ Is there a lot of noise commonly outside of the infant's room while they are asleep? (Noises that wake them up often)
- ☐ Are there overhead lights on in the infant's room while they are sleeping?
- ☐ Are there many small lights on in the infant's room while they are sleeping? (More than two lights)

Sleep Location/ Safety in the Crib/ Co-Sleeping:

- ☐ Does your infant sleep in bed with you/another caregiver?
- ☐ Does your infant sleep somewhere other than a crib or bassinet at night?
- ☐ Does your infant sleep with sheets, blankets, or pillows in the crib?
- ☐ Does your infant's crib have stuffed animals/toys in it?
- ☐ Are there bumper pads on the infant's crib?

Routines

- ☐ Do you have a set bedtime routine/ritual that you use with your infant prior to sleep?
- ☐ Does your infant go to bed at or around the same time every night?
- ☐ Does your infant sleep in the same place every night?

PERSON-ENVIRONMENT VARIABLES

Sensory

- ☐ Does the infant appear to be bothered by certain fabrics or textures? (hands splaying, crying at the touch of different fabrics, avoidant of different textures, etc.)
- ☐ Is your infant often bothered by or sensitive to loud sounds, bright colors/lights, many people in a room, or different temperatures? (Sensory Sensitivity)
- ☐ Is your infant often crashing into items, seen jumping, or like deep pressure? (Sensation Seeking)
- ☐ Does your infant elicit negative behaviors when exposed to or aware of certain sensations, sounds, or environments? (Sensation Avoiding)

Infant Sleep Machines

- ☐ Is there a noise machine on or near (within 3 feet) of the infant's crib/place of sleep?
- ☐ Does the noise machine play for longer than 1 hour?
- ☐ Do you leave the noise machine on for the full night?

Behavior Training

- ☐ Does your infant cry at night when lying them down to sleep?
- ☐ Does your infant cry in the middle of the night until you pick them up/sleep with them?
- ☐ Does your infant need you/the caregiver in the room in order to self-soothe when upset?

Technology Use

- ☐ Does your infant watch TV/movies prior to going to bed? (within 45 minutes of going to bed)

☐ Does your infant watch/play on an iPad or electronic device prior to sleeping? (within 45 minutes of going to bed)

SCORING

Add up the checked number of square boxes in each section and write them below in the corresponding sections.

Person-Occupation: _____

Occupation-Environment: _____

Person-Environment: _____

0 Checkmarks in a section: No problems
1-3 Checkmarks in a section: Low priority
4-7 Checkmarks in a section: Transaction area needs to be addressed
8+ Checkmarks: High priority, Transaction area must be addressed first

Author Note:

This assessment was made by the creators using the concepts from the PEO model, while addressing the different factors that may play a role in affecting infant sleep. Occupational therapists may use this as a guide to determine if an infant/family needs education, intervention, or consultation. This assessment may also inform the therapist on what areas need to be prioritized or addressed first. This assessment was formed to use in conjunction with the educational guide titled, *An Occupational Therapy Holistic Guide to Infant Sleep*. This guide provides insight into the different intervention and education areas outlined in this assessment.

Theory within assessment influenced by:

Law, M., Cooper, B., Strong, S., Stewart, D., Rigby, P., & Letts, L. (1996). The Person-Environment-Occupation Model: A Transactive Approach to Occupational Performance. *Canadian Journal of Occupational Therapy*, *63*(1), 9–23. doi: 10.1177/000841749606300103

CHAPTER V

SUMMARY

The purpose of this project was to address the need for research on infant sleep. Sleep plays a large role in the development of an infant's brain. Lack of or inadequate sleep can lead to dysfunction in cognitive, physical, psychomotor, and socioemotional development as well as familial effects. There are few resources currently available for practitioners to assist with holistically assessing and designing holistic interventions.

This guide is intended for the use of occupational therapists to utilize when assessing, intervention-planning, and educating parents on the topic of infant sleep. This educational guide provides insight into the PEO model and how it can inform and be a way of analyzing infant sleep. It also provides an outline of the current infant assessments that are currently in use and the corresponding assessment made alongside this educational manual, called the *Holistic Infant Sleep Assessment.* This is an assessment meant to target what inhibits an infant's sleep through the lens of the PEO model. After the use of our assessment, this manual gives research-based strategies and interventions for an OT to use and implement or to educate others on. Overall, this occupational therapy guide was meant to be a holistic approach to assessing and implementing interventions to increase the duration and quality of infant sleep.

The limitations of this project include the fact that the authors only researched aspects of sleep that impact only infants (under the age of two years). Because of this, the information cannot be generalized to other children or people of other ages. The

assessment that was created was also not tested for reliability and validity. Another limitation was that although this project was very holistic and comprehensive and contains many different interventions, it does not contain all research on the topic of infant sleep, as the authors chose to only address certain aspects of sleep.

This project will be implemented into practice as the authors will reach out to pediatric occupational therapists around the Grand Forks area to give an educational presentation on the information included in the manual and how to use the assessment form. It was also be sent to other pediatric therapists around North Dakota so that they can utilize this manual and assessment in their practice or use for home programming with families who have an infant that struggles with sleep. The project will also be submitted to *OT Practice.* Currently, the authors are presenting information on this project at Frank Low Research Day at the University of North Dakota. The authors are in the process of obtaining creative commons rights for the products to protect intellectual property.

The authors have a variety of recommendations for future action regarding this project. The authors recommend that future studies test the assessment for effectiveness, reliability, and validity in a variety of different settings with different therapists. It is also recommended that the educational guide be reviewed by occupational therapists that work with infant's birth to two years of age, as it would be beneficial for the researchers to get feedback on the effectiveness of the educational guide, what should be added or included, and what was not helpful. This feedback would allow the researchers to edit the educational guide to improve its effectiveness and accuracy to benefit occupational

therapists addressing infant sleep. The educational guide should be updated as evidence expands on an occupational therapist's role in addressing infant sleep.

The authors conclude that the occupational therapy role on infant sleep is vital, despite sleep being an area of occupation that is not usually reimbursed, as lack of sleep can be impactful to an infant in a harmful way. Occupational therapists have the education, skills, and knowledge to provide holistic therapy to increase the quality of life of infants who struggle with sleep. It is the authors' hope that providing evidence-based materials such as the *Holistic Infant Sleep Assessment* and *An Occupational Therapy Holistic Guide to Infant Sleep* will influence occupational therapists to address infant sleep and advocate for their rights to address a broader range of occupations within our scope of practice.

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